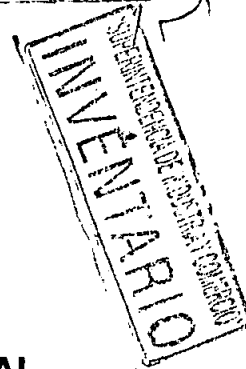


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DELEGATURA PROPIEDAD INDUSTRIAL

División de Nuevas Creaciones

PCT

SOLICITUD

PATENTE DE INVENCION

ENTRADA EN FASE NACIONAL

08-127737

21. EXPEDIENTE No.

54. TITULO

JUNTA UNIVERSAL CON MECANISMO DE ACOPLER PARA ENGANCHAR

CONEXIONES DE HERRAMIENTAS EN FORMA DESMONTABLE

51. CLASIFICACION INTERNACIONAL

71. SOLICITANTE

JODA ENTERPRISES, INC.

DOMICILIO

CHICAGO, IL, ESTADOS UNIDOS DE AMERICA

74. APODERADO

JUAN PABLO CADENA SARMIENTO

22. SANTAFE DE BOGOTÀ, D.C.

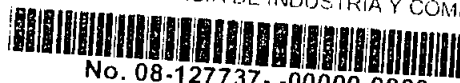
02-01-700

PETITORIO

AS: 109.100



SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 08-127737- -00000-0000

Fecha: 2008-12-01 16:25:08
Tra. 11 PATENTE IYII
Act 411 PRESENTACION

Dep. 2020 NUECREACION I
Eve: 379 FASE NACIONAL II
Fotos: 127

FORMULARIO ÚNICO DE SOLICITUD DE PATENTE PCT ENTRADA EN FASE NACIONAL

1

SOLICITUD DE:

☒ Patente de Invención.

☐ Patente de Modelo de Utilidad.

☐ Capítulo I.

☒ Capítulo II.

2

SOLICITANTE
(71)

Nombre: JODA ENTERPRISES, INC.

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Nacionalidad o Domicilio: Estados Unidos de América
Lugar de Constitución: Estados Unidos de América
Teléfono: Fax:
E-mail

IDENTIFICACIÓN

C.C. ☐ NIT ☐

C.E. ☐ Otro ☐

Cual _____
Número _____

3

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O APODERADO

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C.C. ☒ NIT ☐

C.E. ☐ Otro ☐

Cual _____
Número 80.410.337 TP 57492

4

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Dirección: 2440 Lakeview Avenue #3A, Chicago, IL 60614, US; 1128 Loreta Avenue, Joliet, IL 60435, US (Respectivamente).

Nacionalidad o Domicilio: Estados Unidos de América (Respectivamente).

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Fecha 13-12-2007

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8 Prioridad

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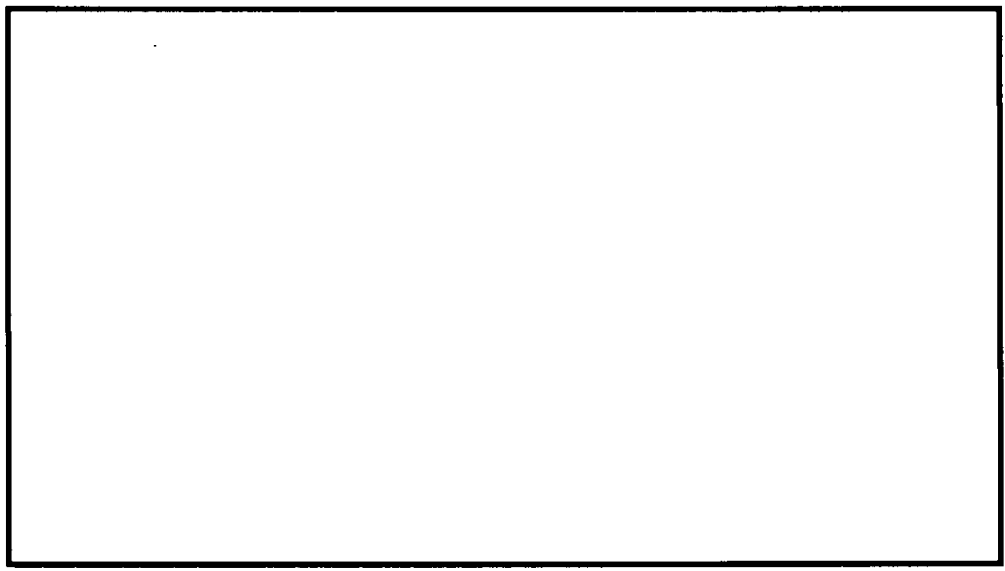
Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

10

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud. \$ 501.000
- ☒ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☒ Poderes, si fuere el caso. **Fotocopia autenticada**
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☐ Declaraciones.
- ☒ Copia de la solicitud internacional. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA.
- ☐ Traducción del examen preliminar efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☐ Arte final 12x12.
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☒ Otros: Tarjeta de Propietarios
Documentos PCT

11 FIGURA CARACTERÍSTICA:



12 Solicito la concesión de la patente,

NOMBRE: JUAN PABLO CADENA SARMIENTO

FIRMA: 
C.C. 80410337 de Usaquén TP 57492 del C.S.J.

109 100

3

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 08 - 85,491
FECHA : OCTUBRE 29 DE 2008

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
BRIGARD & CASTRO LTDA	CONSIGNACION	BANCO DE BOGOTA	062754387	97848461	28/10/2008	30,638,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	501,000.00
		TOTAL :	\$ 501,000.00

SON: QUINIENTOS UN MIL PESOS

RESPONSABLE : _____

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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60/810,239 2 June 2006 (02.06.2006) US(71) Applicant (for all designated States except US): JODA
ENTERPRISES, INC. [US/US]; 2440 Lakeview Avenue,
Chicago, IL 60614 (US).

(72) Inventors; and

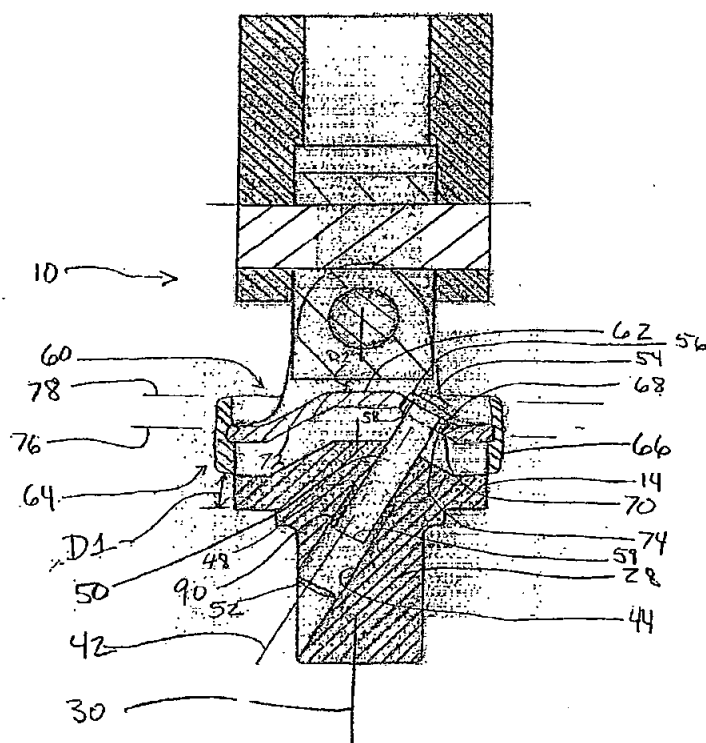
(75) Inventors/Applicants (for US only): DAVIDSON, John
B. [US/US]; 2440 Lakeview Avenue #3A, Chicago, IL
60614 (US). MOON, C. Robert [US/US]; 1128 Loreta
Avenue, Joliet, IL 60435 (US).(74) Agent: ZAYIA, Gregory H.; BRINKS HOFER GILSON
& LIONE, P.O. Box 10087, Chicago, IL 60610 (US).(81) Designated States (unless otherwise indicated, for every
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AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH,
CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES,
FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN,
IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR,
LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX,
MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO,
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[Continued on next page]

(54) Title: UNIVERSAL JOINT WITH COUPLING MECHANISM FOR DETACHABLY ENGAGING TOOL ATTACHMENTS



(57) Abstract: A universal joint includes first and second parts interconnected by a coupling element, and a coupling mechanism for detachably engaging tool attachments such as sockets. The disclosed coupling mechanisms include an engaging element and an actuating element. The engaging element can include a pin, and the pin can be oriented either obliquely or longitudinally in the drive stud of the universal joint. The actuating element can include a collar and a central portion that crosses the central longitudinal axis of the drive stud. The central portion can be offset along the longitudinal axis toward the coupling element, and the actuating element can be configured to extend into an aperture formed by the coupling element and the second part of the universal joint.

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES

PATENTE ☒ PCT/US2007/011344
MODELO DE UTILIDAD ☐ DISEÑO INDUSTRIAL ☐

SOLICITANTE/S. RAZON SOCIAL O APELLIDOS Y NOMBRES JODA ENTERPRISES, INC.

DOMICILIO CHICAGO, IL, ESTADOS UNIDOS DE AMERICA

APODERADO JUAN PABLO CADENA SARMIENTO

TITULO JUNTA UNIVERSAL CON MECANISMO DE ACOPLE PARA ENGANCHAR
CONEXIONES... CLASIFICACION _____

EXPEDIENTE No. _____ FECHA DE SOLICITUD _____ ROLLO MICROFILM _____

CERTIFICADO No. _____ FECHA DE CONCESION _____ VIGENCIA DESDE _____ HASTA _____

PRORROGA _____ CAMBIO DE NOMBRE _____

TRASPASO A _____

INVENTOR (ES) JOHN B. DAVIDSON, C. ROBERT MOON.

OTROS _____

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/11344

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B25B 23/16 (2007.10)

USPC - 81/177.85

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8): B25B23/16 (2007.10)

USPC: 81/177.85

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC(8): B25B23/16 (2007.10)

USPC: 81/177.75, 177.85; 403/74, 322.1, 324, 325, 326, 328, 355

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST(USPT,PGPB,EPAB,JPAB); Internet search via Google Web and Google Scholar search engines. Search Terms Used: universal joint tool engage torque couple actuate drive axis collar pin lock engage release slide movement bias spring mode position angle degree distance length load guide perpendicular oblique

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,433,548 A (ROBERTS et al.) 18 July 1995 (18.07.1995) col. 1 ln. 6 to col. 6 ln. 23, Fig. 1-14	31-35 and 37-46
Y		1-30 and 36
Y	US 5,233,892 A (ROBERTS) 10 August 1993 (10.08.1993) col. 1 ln. 6 to col. 6 ln. 11, Fig 1-6	1-30 and 36
A	US 6,044,730 A (ROBERTS et al.) 04 April 2000 (04.04.2000) col. 1 ln. 49 to col. 8 ln. 16, Fig. 1-10	1-46
A	US 5,644,958 A (ROBERTS et al.) 08 July 1997 (08.07.1997) col. 1 ln. 15 to col. 6 ln. 8, Fig. 1-5	1-46
A	US 6,145,416 A (BONNIOT) 14 November 2000 (14.11.2000) col. 6 ln. 28 to col. 7 ln. 7, Fig. 8, 12	1-46
A	US 5,911,800 A (ROBERTS et al.) 15 June 1999 (15.06.1999) col. 1 ln. 14 to col. 6 ln. 8, Fig. 1-6	1-46

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 December 2007 (10.12.2007)

Date of mailing of the international search report

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Name and mailing address of the ISA/US

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P.O. Box 1450, Alexandria, Virginia 22313-1450

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60/810,239 2 June 2006 (02.06.2006) US

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(72) Inventors; and

(75) Inventors/Applicants (for US only): DAVIDSON, John B. [US/US]; 2440 Lakeview Avenue #3A, Chicago, IL 60614 (US). MOON, C. Robert [US/US]; 1128 Loreta Avenue, Joliet, IL 60435 (US).

(74) Agent: ZAYIA, Gregory H.; BRINKS HOFER GILSON & LIONE, P.O. Box 10087, Chicago, IL 60610 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: UNIVERSAL JOINT WITH COUPLING MECHANISM FOR DETACHABLY ENGAGING TOOL ATTACHMENTS

(57) Abstract: A universal joint includes first and second parts interconnected by a coupling element, and a coupling mechanism for detachably engaging tool attachments such as sockets. The disclosed coupling mechanisms include an engaging element and an actuating element. The engaging element can include a pin, and the pin can be oriented either obliquely or longitudinally in the drive stud of the universal joint. The actuating element can include a collar and a central portion that crosses the central longitudinal axis of the drive stud. The central portion can be offset along the longitudinal axis toward the coupling element, and the actuating element can be configured to extend into an aperture formed by the coupling element and the second part of the universal joint

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UNIVERSAL JOINT WITH COUPLING MECHANISM FOR DETACHABLY ENGAGING TOOL ATTACHMENTS

FIELD OF THE INVENTION

[0001] The present invention relates to mechanisms for altering engagement forces between a universal joint and a tool attachment.

BACKGROUND

[0002] Universal joints have in the past been provided with mechanisms for detachably engaging tool attachments. US Patents 5,660,491 (Roberts, et al.) and 5,433,548 (Roberts, et al.), assigned to the assignee of the present invention, disclose several versions of such mechanisms. Other mechanisms for universal joints are described in US Patents 4,614,457 (Sammon, see column 3, line 32), and 5,291,809 (Fox, III), as well as in US published patent application 2005/0229752 A1 (Nickipuck).

[0003] In addition, many mechanisms have been described for detachably engaging tool attachments to an extension bar, and extension bars are on occasion connected to universal joints. See, for example, the mechanisms disclosed in US Patents 4,848,196 (Roberts, et al.), 5,214,986 (Roberts, et al.), 5,233,892 (Roberts, et al.), 5,501,125 (Roberts, et al.), and 5,644,958 (Roberts, et al.), all assigned to the assignee of the present invention. Other such mechanisms are described in US Patents 4,781,085 (Fox, III) and 4,768,405 (Nickipuck).

SUMMARY

[0004] By way of introduction, the attached drawings show two different mechanisms for altering the engagement forces between the drive stud of a universal joint and a tool attachment. Both of these mechanisms include an actuating element and an engaging element, in which the actuating element extends across the universal joint near the coupling element of the universal joint. In one case the engaging element includes an obliquely-oriented pin, and in the other the engaging element includes a longitudinally-oriented pin. Both

mechanisms are longitudinally compact, and they extend only a small distance beyond the outside diameter of the drive element.

[0005] The scope of the present invention is defined solely by the appended claims, which are not to be limited to any degree by the statements within this summary or the preceding background discussion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figures 1 and 2 are longitudinal sectional views of a universal joint that includes a first preferred embodiment of a mechanism for altering engagement forces; FIG. 1 shows the mechanism in an engaging position and FIG. 2 shows the mechanism in a releasing position.

[0007] Figures 3 and 4 are longitudinal sectional views of a universal joint that includes a second preferred embodiment of a mechanism for altering engagement forces; FIG. 3 shows the mechanism in an engaging position and FIG. 4 shows the mechanism in a releasing position.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0008] FIG. 1 shows a universal joint 10 that includes first and second parts 12, 14 interconnected by a coupling element 16. The coupling element 16 is pivotably connected to the first part 12 by a first pin 18 and to the second part 14 by a second pin 20. In this example, the first part 12 includes a pair of spaced arms 22, and the second part 14 includes a pair of spaced arms 24 (only one of which is shown in FIG. 1). The arms 22, 24 function as load-bearing protrusions that receive the coupling pins 18, 20, respectively and transmit torque between the coupling element 16 and the first and second parts 12, 14, respectively. The first part defines a socket 26 and the second part defines a drive stud 28. The socket 26 may have a different size or configuration than as illustrated, and the socket 26 is not required in all embodiments. If desired, the first part 12 can be provided with another structure for receiving torque, such as a handle similar to the handle of a breaker bar, for example, or an extension bar shaft, T-bar, or other tool or tool part

[0009] The socket 26 is configured to couple the first part to any suitable torque transmitting tool, such as a wrench or an extension bar, for example.

The drive stud 28 is configured for insertion into any suitable tool attachment, and it typically defines an out-of-round cross-section. For example, the drive stud 28 may have a square, hexagonal or other non-circular shape in cross section. The second part 14 will often define a circular cross section between the drive stud 28 and the arms 24, though this is not required. The drive stud 28 defines a central longitudinal axis 30, and the second part 14 cooperates with the coupling element 16 to define an aperture 32 that passes through the universal joint 10 between the coupling element 16 and the second part 14.

[0010] The first part 12 is free to pivot through a limited arc with respect to the coupling element 16 about the first pin 18, and the second part 14 is free to pivot through a limited arc with respect to the coupling element 16 about the second pin 20. These motions allow the universal joint 10 to rotate with the first part 12 positioned at a skew angle with respect to the second part. The arms 24 transmit torque between the coupling element 16 and the drive stud 28. The features of the universal joint 10 described above are conventional, and these features can be configured as described in greater detail in US Patent 5,433,548 (Roberts, et al.). For example, FIG. 1 of US Patent 5,433,548 is a perspective view that shows one possible relationship of the two spaced arms of the second part to the coupling element.

[0011] The universal joint 10 includes a mechanism for altering engagement forces between the universal joint 10 and a tool attachment, as described below. As used throughout this specification and the following claims, the term "tool attachment" refers to any attachment configured to be engaged by the drive stud 28, including but not limited to sockets, extension bars, certain ratchets, and the like.

[0012] In the embodiment of FIGS. 1 and 2, the second part 14 includes a guide 40 that is oriented along a guide direction 42 extending at an oblique angle with respect to the longitudinal axis 30. Preferably the oblique angle between the axis 30 and the guide direction 42 is greater than 10 degrees. In this example, the guide includes an internal passageway 44 in the drive stud 28

and an internal shoulder 48. The internal passageway 44 is oriented at an oblique angle to the axis 30, and in general this oblique angle can be less than 80 degrees. As used herein and the following claims, an internal passageway in the drive stud is one that is surrounded by the drive stud for at least part of its length. Thus, an internal passageway in the drive stud is distinguished from a groove in the surface of the drive stud.

[0013] The illustrated mechanism further includes an engaging element 50 moveably disposed in the guide 40. The engaging element 50 of this example includes a pin having a lower end 52 and an upper end 54. The illustrated engaging element 50 includes a retainer 56 such as a split washer received in a groove in the upper end 54. As shown, the lower surface of the retainer 56 functions as a support surface 58 for the engaging element 50, as described below. Alternatively, the head of the engaging element may be shaped and/or enlarged to provide a support surface without an additional element such as the illustrated retainer 56. The engaging element 50 defines an external shoulder 59 between the lower and upper ends 52, 54.

[0014] As used throughout this specification and the following claims, the term "engaging element" refers to one or a plurality of coupled components, at least one of which is configured for releasably engaging a tool attachment. Thus, this term encompasses both single part engaging elements and multi-part assemblies (including, for example, the multiple part engaging elements shown in FIGS. 4-6 of US Patent application serial number 60/796,382, Attorney Docket 742/294, filed May 1, 2006 and assigned to the assignee of this invention). This related patent application is hereby incorporated by reference in its entirety, except that in the event of any inconsistency between the present specification and this related patent application, the present specification controls.

[0015] The primary function of the engaging element 50 is to hold a tool attachment on the drive stud 28 during normal use. The lower end 52 of the engaging element 50 is configured to engage a tool attachment when the engaging element 50 is in an engaging position, and to release the tool attachment when the engaging element 50 is in a releasing position. As used

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throughout this specification and the following claims, the term "engaging position" does not imply locking the tool attachment in place against all conceivable forces tending to dislodge the tool attachment.

[0016] Though illustrated as a cylindrically-symmetrical pin in FIGS. 1 and 2, the engaging element 50 may take various shapes. If desired, the engaging element 50 may be provided with an out-of-round cross section for some or all of its length, and the passageway 44 may define a complementary shape such that a preferred rotational orientation of the engaging element 50 in the passageway 44 is automatically obtained. That is, the engaging element 50 need not be rotatable in the passageway 44. The terminus of the lower end 52 of the engaging element 50 may be formed in any suitable shape and, for example, may be rounded as shown in U.S. Patent No. 5,911,800, assigned to the assignee of the present invention.

[0017] The illustrated mechanism further includes an actuating element 60 which will be described in connection with FIG. 2 for clarity of illustration. The actuating element 60 in this preferred embodiment includes a central portion 62 which extends close to or actually across the axis 30 and a peripheral portion 64 which remains spaced from the axis 30. The peripheral portion 64 includes a pair of opposed sloping arms 70, 72 and a collar 66. The collar 66 fits closely around the second part 14, and the collar 66 slides longitudinally along a path that is essentially parallel to the axis 30. In this example, the collar 66 defines a groove that extends completely around an inner circumference of the collar, and the outer ends of the sloping arms 72, 74 are received within the groove. This arrangement allows the collar 66 to rotate freely with respect to the sloping arms 70, 72 and the second part 14. Alternatively, the collar 66 may be fixed to the sloping arms 70, 72, or the collar may engage the sloping arms 70, 72 with a different geometry. For example, the collar may define a shelf to engage the sloping arms 70, 72, and a retainer ring on the second part 14 may limit the stroke of the collar in one direction.

[0018] For any given collar design, the sloping arms 70, 72 are angled at an oblique angle with respect to the axis 30, and they serve to offset the central portion 62 relative to the collar 66 along the axis 30 such that the central

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portion 62 is farther from the drive stud 28 in relation to the center of the collar annulus (measured along the axis 30) than it would be if the arms 70, 72 extended transversely to the axis 30. In FIG. 2, the reference number 76 designates a first plane transverse to the axis 30 that passes through the center of mass of the collar 66 when the actuating element 60 is in the raised position shown in FIG. 2. The reference number 78 designates a second plane transverse to the axis 30 that passes through the center of mass of the central portion 62 when the actuating element 60 is in the raised position of FIG. 2. Because of the offset provided by the sloping arms 70, 72, the second plane 78 and the drive stud 28 are positioned on opposite sides of the first plane 76.

[0019] The sloping arm 70 defines an elongated slot 74 that receives the upper end 54 of the engaging element 50. The upper surface of the sloping arm 70 adjacent the slot 74 functions as a support surface 68 that in this example engages the support surface 58 of the retainer 56. Also, in this example the support surface 68 is oriented substantially transversely to the guide direction 42, though this is not required. In many cases it will be preferable to orient the support surface 68 so that it is not parallel either to the axis 30 or to the guide direction 42.

[0020] As shown in FIGS. 1 and 2, the collar 66 extends around the outer circumferential periphery of the second part 14. It is to be understood that alternative structures may likewise be employed, including but not limited to those that extend only partially around a circumference and those that have a short longitudinal length.

[0021] Universal joints of the present invention preferably include at least one biasing element that provides automatic engagement with a tool attachment once the drive stud 28 has been inserted into the tool attachment. In some embodiments, such automatic engagement can operate after the exposed end of the engaging element 50 is pushed to a releasing position by a tool attachment as the drive stud 28 is inserted into the tool attachment. Automatic engagement can also be useful after the actuating element 60 has been used to move the engaging element 50 to a releasing position. In alternative embodiments in which engagement is to be manually initiated by an

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operator's movement of an actuating element, no biasing element may be required. In one alternative, a detent can be used to hold the actuating element in one or more positions, such as an engaging position and a releasing position.

[0022] The embodiment of FIGS. 1 and 2 includes a biasing element 90 that bears on the shoulders 48 and 59 to bias the engaging element 50 and the actuating element 60 to the engaging position shown in FIG 1. The biasing element 90 defines a center of mass that lies within the second part 14. In this case the biasing element 90 biases the engaging element 50 by reacting against the second part 14. In this way, the biasing element 90 provides the desired biasing forces without engagement with the coupling element 16 and independent of any reaction against the coupling element 16.

[0023] Many versions of this invention provide a concealed biasing element (1) that is protected against outside influences such as foreign object or material that may otherwise obstruct operation of the mechanism, and (2) that is unlikely to result in fragments of the biasing element escaping from the universal joint 10 in the event that the biasing element should break apart in use. In this example, the biasing element 90 is a compression-type coil spring that surrounds the engaging element 50 and is positioned within the guide 40, though many other types of biasing elements can be used to perform the biasing functions described above. In alternate embodiments, the biasing element may be implemented in other forms, placed in other positions, bias the engaging element and the actuating element in other directions, and/or be integrated with or coupled directly to other components.

[0024] FIGS. 1 and 2 show the illustrated mechanism in two separate positions. The position of FIG. 1 is the normal rest position, in which the biasing element 90 holds the engaging element 50 and the actuating element 60 in the engaging position.

[0025] As shown in FIG. 2, when external forces are applied to move the collar 66 in a direction away from drive stud 28, the collar 66 moves the engaging element 50 obliquely upwardly in the view of FIGS 1 and 2. This causes the lower end 52 of the engaging element 50 to move out of its

engaging position (i.e., any position in which the terminus of the lower end 52 projects outwardly from drive stud 28 sufficiently to engage the tool attachment) and further into the passageway 44.

[0026] When external forces are removed and the collar 28 is allowed to move away from the position of FIG. 2, the biasing force of the biasing element 90 moves the engaging element 50 toward the position of FIG. 1.

[0027] When the drive stud 28 is simply pushed into a tool attachment, the tool attachment can push the engaging element 50 into the drive stud 28, compressing the biasing element 90 in the process.

[0028] In this example, the region of contact between the engaging element 50 and the actuating element 60 remains inside the periphery of the second part 14, and the collar 66 can be provided with an unusually small outer diameter for a given size of the drive stud 28, even though the engaging element 50 slides obliquely in the second part 14.

[0029] FIGS. 3 and 4 illustrate a second preferred embodiment of the present invention. The basic structure of the universal joint, identified by reference numbers within the range 10-32 in the description of FIGS. 1 and 2, is identical in the two embodiments and will not be described again. In this embodiment, the second part 14 includes a guide 100 that includes an internal passageway 102 in the drive stud 28 and an internal shoulder 104. The guide 100 and the internal passageway 102 in this example is oriented parallel to the central longitudinal axis 30.

[0030] An engaging element 110 is positioned in the guide 100, and this engaging element includes a ball 112, a ramp 114, and a shaft 116. The ramp 114 and the shaft 116 move as a unit and may be formed in one piece if desired. The ball 112 moves along the ramp 114 as the ramp 114 moves longitudinally in the guide 100. The upper end 118 of the shaft 116 defines a groove that receives a retainer 120, such as a split washer for example, and the underside of the retainer 120 forms a support surface 122. As discussed above, it is also possible to shape and/or enlarge the head of the upper end 118 to provide the support surface without the need for an additional part. The ramp 114 defines a shoulder 124 around the shaft 116.

[0031] Turning to FIG. 4 for clarity of illustration, an actuating element 130 includes a central portion 132 and a peripheral portion 134, and the peripheral portion 134 includes a collar 136 and a pair of sloping arms 142, 144. The actuating element 130 is similar to the actuating element 60 described above, except that there is no slot in the sloping arms 142, 144, and there is an opening 144 in the central portion 132. The upper end 118 of the shaft 116 passes through this opening 144. The central portion 132 forms a support surface 138 around the opening 144, and this support surface 138 engages the support surface 122 of the retainer 120 or other support surface of the engaging element.

[0032] As before, the sloping arms 142, 144 offset the central portion 132 toward the coupling element 16 and away from the drive stud 28, and a first plane 146 transverse to the axis 30 and passing through the center of mass of the collar 136 is positioned between a second plane 148 transverse to the axis 30 passing through the center of mass of the central portion 132 and the drive stud 28.

[0033] A biasing element 180 is positioned around the shaft 116 within the guide 100 to bear on the shoulders 104, 124. The biasing element 180 defines a center of mass that lies within the second part 14. In this case the biasing element 180 biases the engaging element 110 by reacting against the second part 14. In this way, the biasing element 180 provides the desired biasing forces without engagement with the coupling element 16 and independent of any reaction against the coupling element 16.

[0034] FIG. 3 shows the illustrated mechanism in the rest position, in which the biasing force of the biasing element 180 holds the engaging element 110 in a tool attachment engaging position. In this position the ball 112 extends outwardly from the drive stud 28 to engage a recess or bore in the socket of a tool attachment (not shown).

[0035] When an operator wishes to release a tool attachment, the collar 136 is moved away from the drive stud 28, thereby compressing the biasing element 180 and moving the ramp upwardly in the view of FIGS. 3 and 4, such

that the ball 112 is free to move into the drive stud 28. In this way a tool attachment is released.

[0036] The embodiments illustrated in the figures both include actuating elements 60, 130 that are configured and positioned to minimize the overall length of the second part 14. The actuators 60, 130 are accessible from the periphery of the second part 14, and they include a central portion 62, 132 that crosses the central longitudinal axis 30. At least a portion of the actuating elements 60, 130 extends into the aperture 32 defined by the coupling element 16 and the second part 14, for at least some positions of the actuating element 60, 130. Similarly, at least some portion of the actuating elements 60, 130 extends between the load-bearing protruding elements 24 of the second part 14 for at least some positions of the actuating elements 60, 130.

[0037] Stated another way, the engaging element 50, 110 and/or the actuating element 60, 130 can be moved to a position that is close to the coupling element 16. With reference to FIGS 2 and 4, the actuating element 60, 130 moves through a stroke that has a longitudinal length $D1$. At closest approach, the closer of the engaging element 50, 110 and the actuating element 60, 130 approaches the coupling element 16 to within a longitudinal distance $D2$. (In the event of contact between the closer of the engaging element 50, 110 and the actuating element 60, 130 and the coupling element 16, $D2$ equals zero.) $D2$ is preferably less than five times $D1$, more preferably less than two times $D1$, and most preferably less than $D1$.

[0038] As another measure of the longitudinal compactness of the illustrated designs, the center of mass of the engaging element is positioned close to the wall of the second part farthest from the drive stud when the engaging element is in the rest position. With reference to FIGS 1 and 3, the center of mass 92, 182 of the engaging element 50, 110 is separated by a longitudinal distance $D3$ from the wall 94, 184 of the second part 12 farthest from the drive stud 28 that crosses the axis 30, respectively. $D3$ is preferably less than eight times $D1$ (FIGS. 2 and 4, respectively), more preferably less than five times $D1$, and most preferably less than three times $D1$.

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[0039] Throughout this description and in the appended claims, the following definitions are to be understood:

[0040] The term "coupled" and various forms thereof are intended broadly to encompass both direct and indirect coupling. Thus, a first part is said to be coupled to a second part when the two parts are directly coupled (e.g. by direct contact or direct functional engagement), as well as when the first part is functionally engaged with an intermediate part which is in turn functionally engaged either directly or via one or more additional intermediate parts with the second part. Also, two parts are said to be coupled when they are functionally engaged (directly or indirectly) at some times and not functionally engaged at other times.

[0041] The term "engage" and various forms thereof, when used with reference to retention of a tool attachment, refer to the application of any forces that tend to hold a tool and a tool attachment together against inadvertent or undesired separating forces (e.g., such as may be introduced during use of the tool). It is to be understood, however, that engagement does not in all cases require an interlocking connection that is maintained against every conceivable type or magnitude of separating force.

[0042] The designations "upper" and "lower" used in reference to elements shown in the drawings are applied merely for convenience of description. These designations are not to be construed as absolute or limiting and may be reversed. For the sake of clarity, unless otherwise noted, the term "upper" generally refers to the side of an element that is farther from a coupling end such as a drive stud. In addition, unless otherwise noted, the term "lower" generally refers to the side of an element that is closer to the coupling end.

[0043] The term "longitudinal" refers to directions that are generally parallel to the length direction of the drive stud. In the embodiments described above, the longitudinal direction is generally parallel to the longitudinal axis 30.

[0044] The term "element" includes both single-part components and multiple-part components. Thus, an element may be made up of two or more separate components that cooperate to perform the function of the element.

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[0045] As used herein, movement of an element toward a position (e.g., engaging or releasing) or toward a particular component (e.g., toward or away from a drive stud) includes all manner of longitudinal motions, skewed motions, rotational motions, and combinations thereof.

[0046] The term "relative movement" as applied to translation between two parts refers to any movement whereby the center of mass of one part moves in relation to the center of mass of another part.

[0047] As used herein, the term "biasing element" refers to any device that provides a biasing force. Representative biasing elements include but are not limited to springs (e.g., elastomeric or metal springs, torsion springs, coil springs, leaf springs, tension springs, compression springs, extension springs, spiral springs, volute springs, flat springs, and the like), detents (e.g., spring-loaded detent balls, cones, wedges, cylinders, and the like), pneumatic devices, hydraulic devices, and the like, and combinations thereof.

[0048] The tools described above are characterized in varying degrees by some or all of the following features: simple construction; a small number of easily manufactured parts; easy access to an operator using the tool in a tight and/or restricted workspace; rugged, durable, and reliable construction; an ability to accommodate various tool attachments, including those with various sizes and configurations of recesses designed to receive a detent; self adjusting for wear; substantially eliminating any precise alignment requirements; readily cleanable; presenting a minimum of snagging surfaces; extending outwardly from the tool by a small amount; and having a short longitudinal length.

[0049] The mechanisms illustrated in the drawings include actuating elements that have a maximum cross-sectional dimension that is only slightly larger than that of the second part on which they are mounted. Such an actuating element brings several advantages. Since the actuating element has a small outside diameter, the resulting tool is compact and easily used in tight spaces. Also, the actuating element is less subject to being accidentally moved to the releasing position during use, because it presents a smaller cross-section than many tool attachments.

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[0050] Of course, it should be understood that a wide range of changes and modifications can be made to the preferred embodiments described above. For example, the actuating element may employ only one sloping arm rather than the pair of opposed sloping arms illustrated. Also, for convenience various positions of the engaging elements and the actuating elements have been described. It will of course be understood that the term "position" is intended to encompass a range of positions, as is appropriate for tool attachments that have recesses and bores of varying shapes and dimensions.

[0051] It is therefore intended that the foregoing detailed description be regarded as illustrative rather than limiting, and that it be understood that it is the following claims, including all equivalents, which are intended to define the scope of this invention.

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WE CLAIM

1. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing position;

an actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element;

said actuating element crossing the central longitudinal axis.

2. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing position;

an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said second part comprising at least two load-bearing protrusions configured to participate in torque transmission between the coupling element

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and the second part, at least part of said actuating element extending between the load-bearing protrusions for at least some positions of the actuating element.

3. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing position;

an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said coupling element and said second part cooperating to form an aperture, at least part of said actuating element extending into the aperture for at least some positions of the actuating element.

4. The invention of Claim 1, 2, or 3 wherein the actuating element comprises a collar extending around the second part.

5. The invention of Claim 1, 2, or 3 wherein engaging element moves along a first direction in the guide, wherein the actuating element comprises a support surface near the engaging element, and wherein the support surface is oriented non-parallel to the first direction and non-parallel to the central longitudinal axis.

6. The invention of Claim 5 wherein the support surface is oriented substantially perpendicularly to the first direction.

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7. The invention of Claim 1 or 3 wherein the second part comprises two spaced arms positioned on respective sides of the coupling element, and wherein at least some part of the actuating element extends between the two spaced arms, for at least some positions of the actuating element with respect to the second part.

8. The invention of Claim 5 wherein the engaging element comprises a second support surface positioned to engage the first-named support surface of the actuating element.

9. The invention of Claim 1, 2, or 3 wherein the actuating element is accessible from a periphery of the second part and crosses the central longitudinal axis.

10. The invention of Claim 1, 2, or 3 wherein said actuating element comprises a peripheral portion and a central portion, said peripheral portion oriented at least in part at an oblique angle with respect to the central longitudinal axis of the drive stud to offset said central portion away from the drive stud along the central longitudinal axis.

11. The invention of Claim 10 wherein the peripheral portion comprises a first sloping arm extending at an oblique angle away from the central portion.

12. The invention of Claim 11 wherein the peripheral portion further comprises a second sloping arm extending at an oblique angle away from the central portion.

13. The invention of Claim 12 wherein the first and second arms are positioned on opposite sides of the central portion.

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14. The invention of Claim 10 wherein the actuating element is coupled to the engaging element at the peripheral portion.

15. The invention of Claim 1, 2, or 3 further comprising a biasing element operative to bias the actuating element toward a rest position while remaining free of engagement with the coupling element.

16. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position;

an actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element;

said actuating element comprising a peripheral portion and a central portion, said peripheral portion positioned away from the drive stud and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud;

said actuating element crossing the central longitudinal axis.

17. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position;

an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said actuating element comprising a peripheral portion and a central portion, said peripheral portion positioned away from the drive stud and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud;

said second part comprising at least two load-bearing protrusions configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element extending between the load-bearing protrusions for at least some positions of the actuating element.

18. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position;

an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said actuating element comprising a peripheral portion and a central portion, said peripheral portion positioned away from the drive stud and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud;

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said coupling element and said second part cooperating to form an aperture, at least part of said actuating element extending into the aperture for at least some positions of the actuating element.

19. The invention of Claim 16, 17, or 18 wherein the actuating element comprises a collar extending around the second part.

20. The invention of Claim 16, 17, or 18 wherein the central portion is offset away from the drive stud along the central longitudinal axis by the peripheral portion.

21. The invention of Claim 19 wherein the collar is centered on a first plane oriented transversely to the longitudinal axis of the drive stud when the actuating element is in a first position with respect to the second part.

22. The invention of Claim 21 wherein the central portion is centered on a second plane oriented transversely to the longitudinal axis when the actuating element is in the first position.

23. The invention of Claim 22 wherein the drive stud and the second plane are positioned on opposite sides of the first plane.

24. The invention of Claim 19 wherein the peripheral portion comprises a first sloping arm extending at an oblique angle between the collar and the central portion.

25. The invention of Claim 24 wherein the peripheral portion further comprises a second sloping arm extending at an oblique angle between the collar and the central portion.

26. The invention of Claim 25 wherein the first and second arms are positioned on opposite sides of the central portion.

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27. The invention of Claim 16, 17, or 18 wherein the actuating element is coupled to the engaging element at the central portion.

28. The invention of Claim 16, 17, or 18 wherein the actuating element is coupled to the engaging element at the peripheral portion.

29. The invention of Claim 16 or 18 wherein the second part comprises two spaced arms positioned on respective sides of the coupling element, and wherein at least some part of the actuating element extends between the two spaced arms, for at least some positions of the actuating element with respect to the second part.

30. The invention of Claim 16, 17, or 18 further comprising a biasing element operative to bias the actuating element toward a rest position while remaining free of engagement with the coupling element.

31. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees with respect to a central longitudinal axis of the drive stud;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position; and

an actuating element comprising a collar extending around the second part;

said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said actuating element movable with respect to the second part through a stroke having a longitudinal length D1, and said second part configured such that at closest approach the closer of the actuating element and the engaging element approaches the coupling element to within a longitudinal distance D2, wherein D2 is less than five times D1.

32. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees with respect to a central longitudinal axis of the drive stud;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position, said engaging element defining a center of mass; and

an actuating element comprising a collar extending around the second part;

said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said actuating element movable with respect to the second part through a stroke having a longitudinal length D1, said second part comprising a wall crossing the central longitudinal axis farthest from the drive stud, said center of mass spaced from the wall by a longitudinal distance D3 when the engaging element is in a rest position, wherein D3 is less than eight times D1.

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33. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

- a guide in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees with respect to a central longitudinal axis of the drive stud;

- an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position; and

- an actuating element comprising a collar extending around the second part;

- said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

- said second part comprising at least two load-bearing protrusions configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element extending between the load-bearing protrusions for at least some positions of the actuating element.

34. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

- a guide in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees with respect to a central longitudinal axis of the drive stud;

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an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position; and

an actuating element comprising a collar extending around the second part;

said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element;

said coupling element and said second part cooperating to form an aperture, at least part of said actuating element extending into the aperture for at least some positions of the actuating element.

35. The invention of Claim 31, 32, 33, or 34 wherein the internal passageway is oriented substantially parallel to the central longitudinal axis.

36. The invention of Claim 31, 32, 33, or 34 wherein the internal passageway is oriented at an oblique angle to the central longitudinal axis.

37. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position;

an actuating element accessible from a periphery of the second element and crossing a central longitudinal axis of the second part, said actuating element comprising a collar extending around the second part;

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said actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element; and

a biasing element operative to bias the actuating element toward a rest position independently of any reaction against the coupling element;

said actuating element movable with respect to the second part through a stroke having a longitudinal length D1, and said second part configured such that at closest approach the closer of the actuating element and the engaging element approaches the coupling element to within a longitudinal distance D2, wherein D2 is less than five times D1.

38. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

a guide in the second part;

an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position, said engaging element comprising a center of mass;

an actuating element accessible from a periphery of the second element and crossing a central longitudinal axis of the second part, said actuating element comprising a collar extending around the second part;

said actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element; and

a biasing element operative to bias the actuating element toward a rest position independently of any reaction against the coupling element;

said actuating element movable with respect to the second part through a stroke having a longitudinal length D1, said second part comprising a wall crossing the central longitudinal axis farthest from the drive stud, said center of

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mass spaced from the wall by a distance $D3$ when the engaging element is in a rest position, wherein $D3$ is less than eight times $D1$.

39. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

- a guide in the second part;

- an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position;

- an actuating element accessible from a periphery of the second element and crossing a central longitudinal axis of the second part, said actuating element comprising a collar extending around the second part;

- said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; and

- a biasing element operative to bias the actuating element toward a rest position independently of any reaction against the coupling element;

- said second part comprising at least two load-bearing protrusions configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element extending between the load-bearing protrusions for at least some positions of the actuating element.

40. In a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, the improvement comprising:

- a guide in the second part;

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an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position;

an actuating element accessible from a periphery of the second element and crossing a central longitudinal axis of the second part, said actuating element comprising a collar extending around the second part;

said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; and

a biasing element operative to bias the actuating element toward a rest position independently of any reaction against the coupling element;

said coupling element and said second part cooperating to form an aperture, at least part of said actuating element extending into the aperture for at least some positions of the actuating element.

41. The invention of Claim 37, 38, 39, or 40 wherein the biasing element is disposed in the guide.

42. The invention of Claim 37, 38, 39, or 40 wherein the biasing element is disposed substantially entirely within the second part.

43. The invention of Claim 37, 38, 39, or 40 wherein the biasing element is disposed around the engaging element.

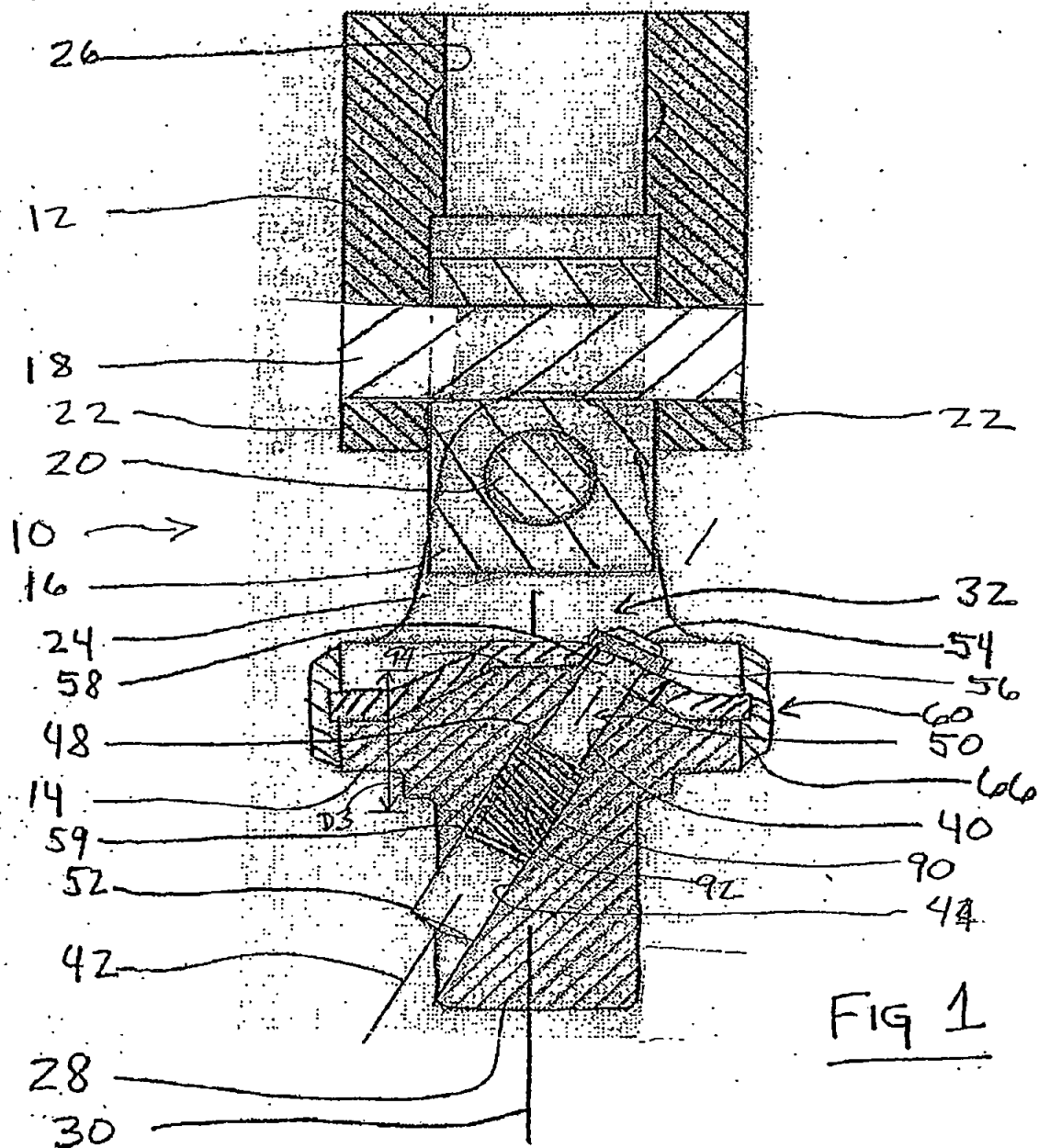
44. The invention of Claim 37, 38, 39, or 40 wherein the biasing element is characterized by a center of mass, and wherein the center of mass is positioned within the second part for at least some positions of the actuating element.

45. The invention of Claim 37, 38, 39, or 40 wherein said actuating element is movable longitudinally to positions increasingly external to the second part.

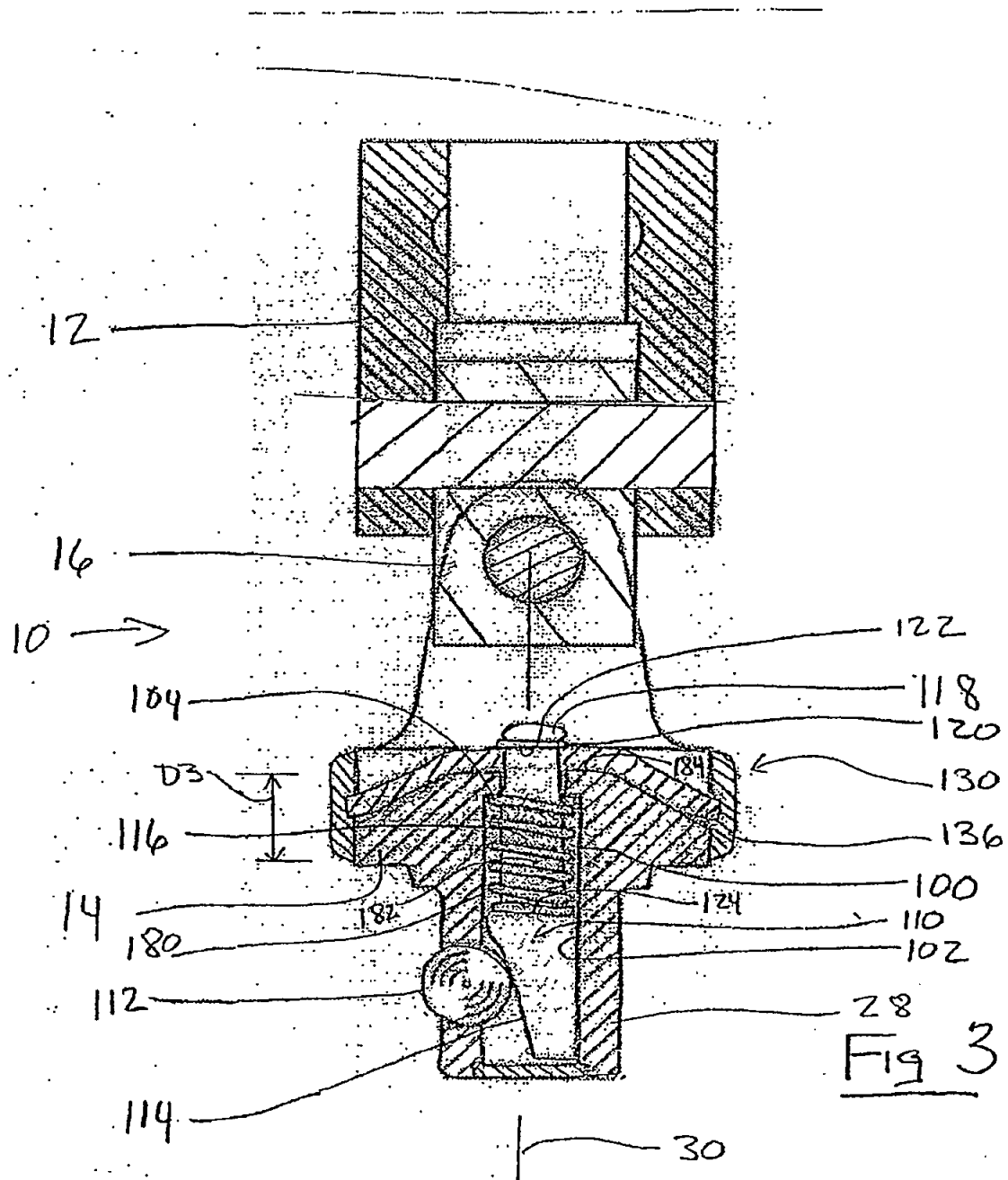
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46. The invention of Claim 37, 38, or 40 wherein the second part comprises two spaced arms positioned on respective sides of the coupling element, and wherein at least some part of the actuating element extends between the two spaced arms, for at least some positions of the actuating element with respect to the second part.

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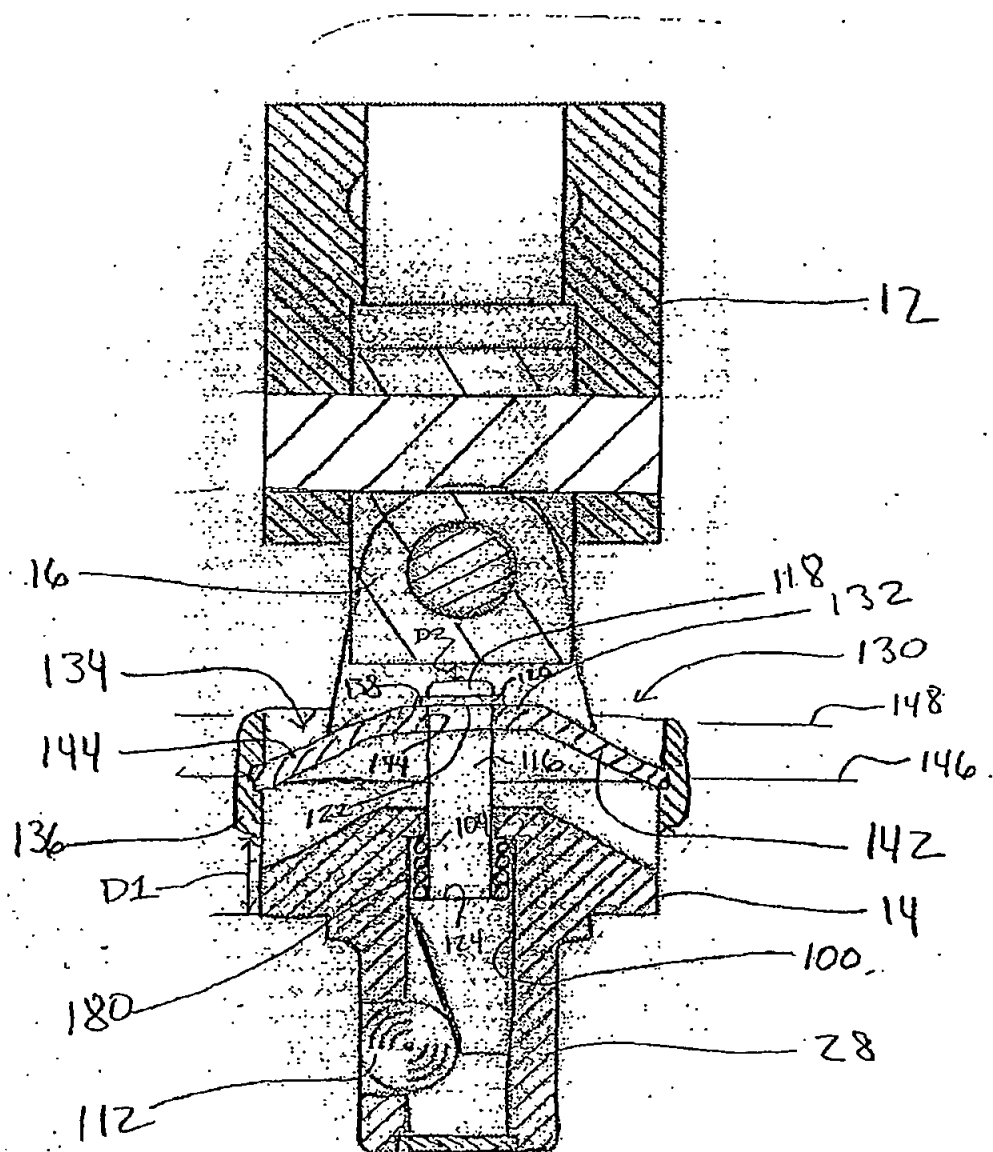


Fig 4

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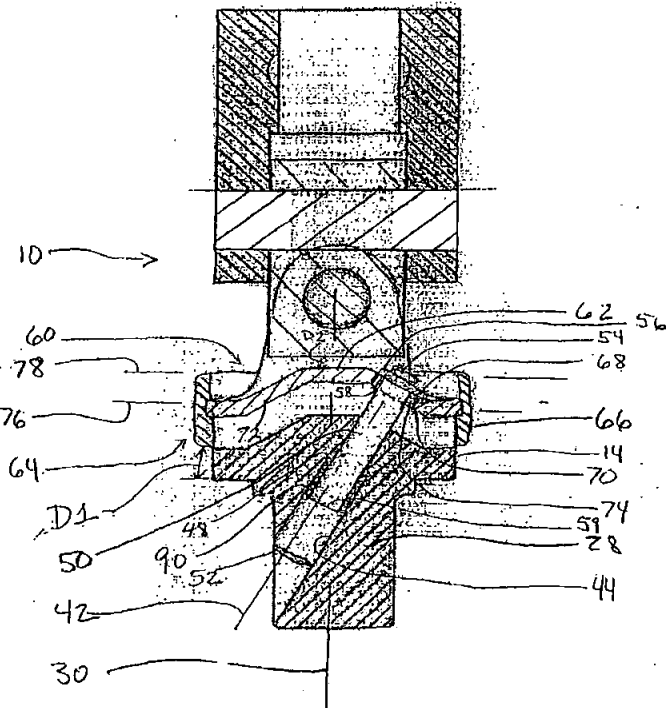
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[Continúa en la página siguiente]

(54) Título: JUNTA UNIVERSAL CON MECANISMO DE ACOUPLE PARA ENGANCHAR CONEXIONES DE HERRAMIENTAS EN FORMA DESMONTABLE



(57) Extracto: Una junta universal incluye partes primera y segunda, interconectadas por un elemento de acople, y un mecanismo de acoplamiento para enganchar en forma desmontable conexiones de herramientas, tales como copas. Los mecanismos de acoplamiento divulgados incluyen un elemento de enganche y un elemento actuador. El elemento de enganche puede incluir un pasador, y el pasador puede orientarse o bien oblicuamente o bien longitudinalmente en el vástago de impulsión de la junta universal. El elemento actuador puede incluir una camisa y una porción central que atraviesa el eje longitudinal central del vástago de impulsión. La porción central puede desplazarse a lo largo del eje longitudinal hacia el elemento de acoplamiento, y el elemento actuador puede configurarse para proyectarse en una abertura formada por el elemento de acoplamiento y la segunda parte de la junta universal.

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JUNTA UNIVERSAL CON MECANISMO DE ACOUPLE PARA ENGANCHAR CONEXIONES DE HERRAMIENTAS EN FORMA DESMONTABLE

CAMPO DE LA INVENCION

[0001] La presente invención se refiere a mecanismos para alterar fuerzas de enganche entre una junta universal y una conexión de herramienta.

ARTE PREVIO

[0002] En el pasado, las juntas universales se han provisto con mecanismos para enganchar conexiones de herramienta en forma desmontable. Las Patentes de los Estados Unidos 5,660,491 (Roberts, *et al.*) y 5,433,548 (Roberts, *et al.*), asignadas al cesionario de la presente invención, divulgan varias versiones de tales mecanismos. Otros mecanismos para juntas universales se describen en las Patentes de los Estados Unidos 4,614,457 (Sammon, véase columna 3, renglón 32), y 5,291,809 (Fox, III), así como en la solicitud publicada de Patente de los Estados Unidos 2005/0229752 A1 (Nickipuck).

[0003] Adicionalmente, se han descrito muchos mecanismos para enganchar conexiones de herramientas en forma desmontable a una barra de extensión, y las barras de extensión se conectan ocasionalmente a las juntas universales. Véase, por ejemplo, los mecanismos divulgados en las Patentes de los Estados Unidos 4,848,196 (Roberts, *et al.*), 5,214,986 (Roberts, *et al.*), 5,233,892 (Roberts, *et al.*), 5,501,125 (Roberts, *et al.*), y 5,644,958 (Roberts, *et al.*), todas asignadas al cesionario de la presente invención. Otros mecanismos de ese tipo se describen en las Patentes de los Estados Unidos 4,781,085 (Fox, III) y 4,768,405 (Nickipuck).

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SUMARIO

[0004] A modo de introducción, los dibujos adjuntos muestran dos diferentes mecanismos para alterar las fuerzas de enganche entre el vástago de impulsión de una junta universal y una conexión de herramienta. Ambos mecanismos incluyen un elemento actuador y un elemento de enganche, en el cual el elemento actuador se extiende a través de la junta universal cerca del elemento de acoplamiento de la junta universal. En un caso el elemento de enganche incluye un pasador orientado oblicuamente y, en el otro, el elemento de enganche incluye un pasador orientado longitudinalmente. Ambos mecanismos son longitudinalmente compactos y se proyectan únicamente en una pequeña distancia más allá del diámetro del elemento de impulsión.

[0005] El ámbito de la presente invención se define únicamente por las reivindicaciones anexas, las cuales no se limitan en ningún grado por las declaraciones contenidas en este sumario o la anterior discusión del arte previo.

BREVE DESCRIPCIÓN DE LOS DIBUJOS

[0006] Figuras 1 y 2 son vistas en corte longitudinal de una junta universal, que incluye una primera incorporación preferida de un mecanismo para alterar fuerzas de enganche; FIG. 1 muestra el mecanismo en una posición de enganche y FIG. 2 muestra el mecanismo en una posición liberadora.

[0007] Figuras 3 y 4 son vistas en corte longitudinal de una junta universal, que incluye una segunda incorporación preferida de un mecanismo para alterar fuerzas de enganche; FIG. 3 muestra el mecanismo en una posición de enganche y FIG. 4 muestra el mecanismo en una posición liberadora.

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DESCRIPCIÓN DETALLADA DE INCORPORACIONES PREFERIDAS

[0008] FIG. 1 muestra una junta universal 10 que incluye las partes primera y segunda 12, 14 interconectadas por un elemento de acoplamiento 16. El elemento de acoplamiento 16 se conecta con pivotamiento a la primera parte 12 por un primer pasador 18 y a la segunda parte 14 por un segundo pasador 20. En este ejemplo, la primera parte 12 incluye un par de brazos distanciados 22, y la segunda parte 14 incluye un par de brazos distanciados 24 (sólo uno de los cuales se muestra en FIG. 1). Los brazos 22, 24 funcionan como proyecciones portadoras de carga, que alojan los pasadores de acoplamiento 18, 20, respectivamente, y transmiten fuerza de torsión entre el elemento de acoplamiento 16 y las partes primera y segunda 12, 14, respectivamente. La primera parte define una copa 26 y la segunda parte define un vástago de impulsión 28. La copa 26 puede tener un tamaño o configuración diferente a la ilustrada, y la copa 26 no se requiere en todas las incorporaciones. Si se desea, la primera parte 12 puede proveerse con otra estructura para recibir fuerza de torsión, tal como un mango similar al mango de una barra de cubo, por ejemplo, o un eje de una barra de extensión, barra T, u otra herramienta o parte de herramienta.

[0009] La copa 26 se configura para acoplar la primera parte a cualquier herramienta que transmita fuerza de torsión, tal como una llave o una barra de extensión, por ejemplo. El vástago de impulsión 28 se configura para inserción en cualquier conexión de herramienta apropiada, y típicamente define una sección transversal ovalada. Por ejemplo, el vástago de impulsión 28 puede tener una forma cuadrada, hexagonal u otra forma no circular en sección transversal. La segunda parte 14 definirá a menudo una sección transversal circular entre el vástago de impulsión 28 y los brazos 24, aunque esto no se requiere. El vástago de impulsión 28 define un eje longitudinal central 30, y la segunda parte 14 coopera con el elemento de acoplamiento 16 para definir una abertura 32 que atraviesa la junta

universal 10 entre el elemento de acoplamiento 16 y la segunda parte 14.

[0010] La primera parte 12 es libre de pivotar en un arco limitado con respecto al elemento de acoplamiento 16 sobre el primer pasador 18, y la segunda parte 14 es libre de pivotar en un arco limitado con respecto al elemento de acoplamiento 16 sobre el segundo pasador 20. Estos movimientos permiten que la junta universal 10 gire con la primera parte 12 posicionada en un ángulo oblicuo con respecto a la segunda parte. Los brazos 24 transmiten fuerza de torsión entre el elemento de acoplamiento 16 y el vástago de impulsión 28. Las características de la junta universal 10 descrita anteriormente son convencionales, y estas características pueden configurarse como se describe con mayor detalle en la Patente de los Estados Unidos 5,433,548 (Roberts, *et al.*). Por ejemplo, FIG 1 de la Patente de los Estados Unidos 5,433,548 es una vista en perspectiva, que muestra una posible relación de los dos brazos distanciados de la segunda parte con el elemento de acoplamiento.

[0011] La junta universal 10 incluye un mecanismo para alterar fuerzas de enganche entre la junta universal 10 y una conexión de herramienta, como se describe a continuación. Como se usa a lo largo de esta especificación y las siguientes reivindicaciones, el término "conexión de herramienta" se refiere a cualquier conexión que se va a enganchar por el vástago de impulsión 28, incluidas sin limitación copas, barras de extensión, algunos trinquetes, y similares.

[0012] En la incorporación de FIGS. 1 y 2, la segunda parte 14 incluye una guía 40, orientada a lo largo de una dirección de guía 42 que se extiende en un ángulo oblicuo con respecto al eje longitudinal 30. Preferiblemente el ángulo oblicuo entre el eje 30 y la dirección de la guía 42 es mayor de 10 grados. En este ejemplo, la guía incluye un pasaje interno 44 en el vástago de impulsión 28 y resalto interno 48. El pasaje interno 44 se orienta en un ángulo oblicuo al eje 30 y, en general, este

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ángulo oblicuo puede ser menor de 80 grados. Tal como se emplea en esta solicitud y en las siguientes reivindicaciones, un pasaje interno en el vástago de impulsión es uno rodeado por el vástago de impulsión en por lo menos parte de su longitud. Por consiguiente, un pasaje interno en el vástago de impulsión se distingue de un surco en la superficie del vástago de impulsión.

[0013] El mecanismo ilustrado incluye además un elemento de enganche **50**, dispuesto con posibilidad de deslizamiento en la guía **40**. El elemento de enganche **50** de este ejemplo incluye un pasador con un extremo inferior **52** y un extremo superior **54**. El elemento de enganche **50** ilustrado incluye un retenedor **56**, tal como una arandela partida alojada en un surco en el extremo superior **54**. Tal como se ilustra, la superficie inferior del retenedor **56** funciona como una superficie de soporte **58** para el elemento de enganche **50**, como se describe más adelante. Alternativamente, la cabeza del elemento de enganche puede configurarse y/o ensancharse para proporcionar una superficie de soporte sin un elemento adicional, tal como el retenedor ilustrado **56**. El elemento de enganche **50** define un resalto externo **59** entre los extremos inferior y superior **52**, **54**.

[0014] Tal como se emplea a todo lo largo de esta especificación y las siguientes reivindicaciones, el término "elemento de enganche" se refiere a uno o a una pluralidad de elementos acoplados, configurándose por lo menos uno de éstos para enganchar en forma desmontable una conexión de herramienta. Por consiguiente, este término abarca elementos de enganche mono-parte y ensambles multi-parte (incluidos, por ejemplo, los elementos de enganche multi-parte mostrados en la FIGS. 4-6 de la solicitud de Patente de los Estados Unidos serial No. 60/796,382, Listado de Solicitudes Pendientes 742/294, presentada el 1 de mayo de 2006 y asignada al cesionario de esta invención). Esta solicitud de Patente relacionada se incorpora aquí por referencia en su totalidad excepto que, en el caso de

cualquier inconsistencia entre la presente especificación y esta solicitud de Patente relacionada, rige la presente especificación.

[0015] La función primaria del elemento de enganche **50** es sujetar una conexión de herramienta en el vástago de impulsión **28** durante el uso normal. El extremo inferior **52** del elemento de enganche **50** se configura para enganchar una conexión de herramienta, cuando el elemento de enganche **50** está en una posición de enganche, y para soltar la conexión de herramienta cuando el elemento de enganche **50** está en una posición liberadora. Tal como se emplea a todo lo largo de esta especificación y las siguientes reivindicaciones, el término "posición de enganche" no implica bloquear la conexión de herramienta en su sitio contra todas las fuerzas concebibles que tienden a desalojar la conexión de herramienta

[0016] Aunque ilustrado como un pasador cilíndricamente simétrico en FIGS. 1 y 2, el elemento de enganche **50** puede adoptar varias formas. Si se desea, el elemento de enganche **50** puede proveerse con una sección transversal ovalada en alguna o toda su longitud, y el pasaje **44** puede definir una forma complementaria, tal que se obtenga automáticamente una orientación de rotación preferida del elemento de enganche **50** en el pasaje **44**. Es decir, el elemento de enganche **50** no necesita ser giratorio en el pasaje **44**. El remate del extremo inferior **52** del elemento de enganche **50** puede configurarse en cualquier forma apropiada y, por ejemplo, puede ser redondeado, como se muestra en la Patente de los Estados Unidos No. 5,911,800, asignada al cesionario de la presente invención.

[0017] El mecanismo ilustrado incluye además un elemento actuador **60**, el cual se describirá en conexión con FIG. 2 para claridad de ilustración. En esta incorporación preferida, el elemento actuador **60** comprende una porción central **62**, la cual se proyecta adyacente al eje **30** o, prácticamente, a través de él, y una porción periférica **64**, que permanece distanciada del eje **30**. La porción periférica **64** incluye un par de brazos

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inclinados opuestos 70, 72 y una camisa 66. La camisa 66 se ajusta íntimamente alrededor de la segunda parte 14, y la camisa 66 se desliza longitudinalmente a lo largo de un trayecto esencialmente paralelo al eje 30. En este ejemplo, la camisa 66 define un surco, que se extiende completamente alrededor de una circunferencia interna de la camisa, y los extremos exteriores de los brazos inclinados 72, 74 se alojan en el surco. Este arreglo permite que la camisa 66 gire libremente con respecto a los brazos inclinados 70, 72 y la segunda parte 14. Alternativamente, la camisa 66 puede fijarse a los brazos inclinados 70, 72, o la camisa puede engranar los brazos inclinados 70, 72 con una geometría diferente. Por ejemplo, la camisa puede definir un asiento para engranar los brazos inclinados 70, 72, y un anillo retenedor en la segunda parte 14 puede limitar la carrera de la camisa en una dirección.

[0018] Para cualquier diseño dado de la camisa, los brazos inclinados 70, 72 se orientan en un ángulo oblicuo, con respecto al eje 30, y sirven para desplazar la porción central 62, en relación con la camisa 66, a lo largo del eje 30, de modo que la porción central 62 se aleje más del vástago de impulsión 28 en relación con el centro del anillo de la camisa (medido a lo largo del eje 30), de que lo que estaría si los brazos 70, 72 se extendieran transversalmente al eje 30. En FIG. 2, el número de referencia 76 designa un primer plano transversal al eje 30, que atraviesa el centro de masas de la camisa 66 cuando el elemento actuador 60 está en la posición levantada mostrada en FIG. 2. El número de referencia 78 designa un segundo plano transversal al eje 30, que atraviesa el centro de masas de la porción central 62 cuando el elemento actuador 60 está en la posición levantada de FIG. 2. Debido al desplazamiento provisto por los brazos inclinados 70, 72, el segundo plano 78 y el vástago de impulsión 28 se posicionan en lados opuestos del primer plano 76.

[0019] El brazo inclinado 70 define una ranura alargada 74 que aloja el extremo superior 54 del elemento de enganche 50. La superficie superior

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del brazo inclinado 70, adyacente a la ranura 74, funciona como una superficie de soporte 68 que, en este ejemplo, engrana la superficie de soporte 58 del retenedor 56. Igualmente, en este ejemplo, la superficie de soporte 68 se orienta en forma sustancialmente transversal a la dirección de la guía 42, aunque esto no se requiere. En muchos casos, será preferible orientar la superficie de soporte 68 de tal modo que no sea paralela al eje 30 o a la dirección de la guía 42.

[0020] Como se muestra en FIGS. 1 y 2, la camisa 66 se extiende alrededor de la periferia circunferencial exterior de la segunda parte 14. Hay que entender que, de igual forma, pueden emplearse estructuras alternativas, incluidas sin limitación aquellas que se extienden sólo parcialmente alrededor de una circunferencia y aquellas que tienen un tramo longitudinal corto.

[0021] Preferiblemente, las juntas universales de la presente invención incluyen por lo menos un elemento de empuje, que permite un engrane automático con una conexión de herramienta luego de que el vástago de impulsión 28 se ha insertado en la conexión de herramienta. En algunas incorporaciones, tal engrane automático puede operar después que el extremo expuesto del elemento de enganche 50 se empuja a una posición liberadora por una conexión de herramienta a medida que el vástago de impulsión 28 se inserta en la conexión de herramienta. También puede ser útil un engrane automático una vez se ha usado el elemento actuador 60 para mover el elemento de enganche 50 a una posición liberadora. En incorporaciones alternativas, en las cuales el engrane tiene que iniciarse manualmente por el movimiento de un operador de un elemento actuador, puede no requerirse elemento de empuje. En una incorporación alternativa, puede usarse un seguro para sujetar el elemento actuador en una o más posiciones, tal como una posición de enganche y una posición liberadora.

[0022] La incorporación de FIGS. 1 y 2 incluye un elemento de

empuje 90 que descansa sobre los resaltos 48 y 59 para empujar el elemento de enganche 50 y el elemento actuador 60 a la posición de enganche mostrada en FIG 1. El elemento de empuje 90 define un centro de masas ubicado en la segunda parte 14. En este caso el elemento de empuje 90 presiona el elemento de enganche 50 reaccionando contra la segunda parte 14. De esta manera, el elemento de empuje 90 provee las fuerzas de empuje deseadas sin engrane con el elemento de acoplamiento 16 e independiente de cualquier reacción contra el elemento de acoplamiento 16.

[0023] Muchas versiones de esta invención proveen un elemento de empuje oculto (1) que se protege contra influencias externas, tales como un objeto o material externo que pueda obstruir en otra forma la operación del mecanismo, y (2) que es poco probable que resulte en escape de fragmentos del elemento de empuje de la junta universal 10, en el caso que el elemento de empuje se rompa mientras está en uso. En este ejemplo, el elemento de empuje 90 es un resorte en espiral tipo compresión, que rodea el elemento de enganche 50 y se posiciona en la guía 40, aunque pueden utilizarse muchos otros tipos de elementos de empuje para realizar las funciones de presión descritas anteriormente. En incorporaciones alternativas, el elemento de empuje puede implementarse en otras formas, ubicarse en otras posiciones, presionar el elemento de enganche y el elemento actuador en otras direcciones, y/o integrarse o acoplarse directamente con otros componentes.

[0024] FIGS. 1 y 2 muestran el mecanismo ilustrado en dos posiciones distintas. La posición de FIG. 1 es la posición de reposo normal, en la cual el elemento de empuje 90 sujeta el elemento de enganche 50 y el elemento actuador 60 en la posición de enganche.

[0025] Como se muestra en FIG. 2, cuando se aplican fuerzas externas para mover la camisa 66 en una dirección alejada del vástago de

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impulsión **28**, la camisa **66** mueve el elemento de enganche **50** oblicuamente hacia arriba en la vista de FIGS 1 y 2. Esto hace que el extremo inferior **52** del elemento de enganche **50** salga de su posición de enganche (es decir, cualquier posición en la cual el término del extremo inferior **52** se proyecta hacia afuera del vástago de impulsión **28** en forma suficiente para engranar la conexión de herramienta) y más adentro en el pasaje **44**.

[0026] Cuando se suprimen las fuerzas externas y se permite a la camisa **28** alejarse de la posición de FIG. 2, la fuerza de empuje del elemento de empuje **90** mueve el elemento de enganche **50** hacia la posición de FIG. 1.

[0027] Cuando el vástago de impulsión **28** se empuja simplemente en una conexión de herramienta, la conexión de herramienta puede empujar el elemento de enganche **50** dentro del vástago de impulsión **28**, comprimiendo el elemento de empuje **90** en el proceso.

[0028] En este ejemplo, la región de contacto entre el elemento de enganche **50** y el elemento actuador **60** permanece dentro de la periferia de la segunda parte **14**, y la camisa **66** puede proveerse con un diámetro exterior inusualmente pequeño para un tamaño dado del vástago de impulsión **28**, aún cuando el elemento de enganche **50** se deslice oblicuamente en la segunda parte **14**.

[0029] FIGS. 3 y 4 ilustran una segunda incorporación preferida de la presente invención. La estructura básica de la junta universal, identificada por números de referencia en el rango **10-32** en la descripción de FIGS. 1 y 2, es idéntica en las dos incorporaciones y no se describirá de nuevo. En esta incorporación, la segunda parte **14** incluye una guía **100** con un pasaje interno **102** en el vástago de impulsión **28** y un resalto interno **104**. La guía **100** y el pasaje interno **102** en este ejemplo se orientan paralelos al eje

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longitudinal central 30.

[0030] Un elemento de enganche 110 se posiciona en la guía 100, y este elemento de enganche incluye una bola 112, una rampa 114 y un eje 116. La rampa 114 y el eje 116 se mueven como una unidad y puede conformarse de una sola pieza, si se desea. La bola 112 se mueve a lo largo de la rampa 114 a medida que la rampa 114 se desliza longitudinalmente en la guía 100. El extremo superior 118 del eje 116 define un surco, que aloja un retenedor 120, tal como una arandela partida por ejemplo, y el lado inferior del retenedor 120 forma una superficie de soporte 122. Como se discutió anteriormente; es también posible configurar y/o ensanchar la cabeza del extremo superior 118 para proporcionar la superficie de soporte sin necesidad de una parte adicional. La rampa 114 define un resalto 124 alrededor del eje 116.

[0031] Volviendo a FIG. 4 para claridad de ilustración, un elemento actuador 130 incluye una porción central 132 y una porción periférica 134, y la porción periférica 134 comprende una camisa 136 y un par de brazos inclinados 142, 144. El elemento actuador 130 es similar al elemento actuador 60 descrito anteriormente, excepto que no hay ranura en los brazos inclinados 142, 144, y que hay un orificio 144 en la porción central 132. El extremo superior 118 del eje 116 atraviesa este orificio 144. La porción central 132 forma una superficie de soporte 138 alrededor del orificio 144, y esta superficie de soporte 138 engrana la superficie de soporte 122 del retenedor 120 u otra superficie de soporte del elemento de enganche.

[0032] Al igual que antes, los brazos inclinados 142, 144 desplazan la porción central 132 hacia el elemento de acoplamiento 16 y la alejan del vástago de impulsión 28, y un primer plano 146, transversal al eje 30 y que atraviesa el centro de masas de la camisa 136, se posiciona entre un segundo plano 148 transversal al eje 30 que atraviesa el centro de masas de

J3

la porción central **132** y el vástago de impulsión **28**.

[0033] Un elemento de empuje **180** se posiciona alrededor del eje **116** en la guía **100** para apoyarse en los resaltos **104**, **124**. El elemento de empuje **180** define un centro de masas ubicado en la segunda parte **14**. En este caso el elemento de empuje **180** presiona el elemento de enganche **110** reaccionando contra la segunda parte **14**. De este modo, el elemento de empuje **180** proporciona las fuerzas de empuje deseadas sin engrane con el elemento de acoplamiento **16** e independiente de cualquier reacción contra el elemento de acoplamiento **16**.

[0034] FIG. 3 muestra el mecanismo ilustrado en la posición de reposo, en la cual la fuerza de empuje del elemento de empuje **180** sujeta el elemento de enganche **110** en una posición de enganche de la conexión de herramienta. En esta posición la bola **112** se proyecta fuera del vástago de impulsión **28** para engranar una depresión o diámetro interno en la copa de una conexión de herramienta (no mostrada).

[0035] Cuando un operador desea soltar una conexión de herramienta, la camisa **136** se aleja del vástago de impulsión **28**, comprimiendo en esa forma el elemento de empuje **180** y moviendo la rampa hacia arriba en la vista de FIGS. 3 y 4, de tal modo que la bola **112** es libre de moverse en el vástago de impulsión **28**. De esta manera se suelta una conexión de herramienta.

[0036] Las incorporaciones ilustradas en las dos figuras incluyen elementos actuadores **60**, **130**, que se configuran y posicionan para minimizar la longitud total de la segunda parte **14**. Los actuadores **60**, **130** son accesibles desde la periferia de la segunda parte **14** e incluyen una porción central **62**, **132** que atraviesa el eje longitudinal central **30**. Por lo menos una porción de los elementos actuadores **60**, **130** se proyecta en la abertura **32** definida por el elemento de acoplamiento **16** y la segunda parte

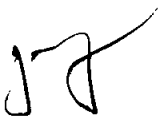
J4

14, en por lo menos algunas posiciones del elemento actuador **60, 130**. Análogamente, por lo menos alguna porción de los elementos actuadores **60, 130** se proyecta entre los elementos saledizos portadores de carga **24** de la segunda parte **14** en por lo menos algunas posiciones de los elementos actuadores **60, 130**.

[0037] Dicho de otra manera, el elemento de enganche **50, 110** y/o el elemento actuador **60, 130** pueden moverse a una posición próxima al elemento de acoplamiento **16**. Con referencia a FIGS. 2 y 4, el elemento actuador **60, 130** se mueve en una carrera con un tramo longitudinal **D1**. Con el acercamiento máximo, la parte más próxima del elemento de enganche **50, 110** y el elemento actuador **60, 130** se acerca al elemento de acoplamiento **16** hasta la distancia longitudinal **D2**. (En el caso de contacto entre la parte más cercana del elemento de enganche **50, 110** y el elemento actuador **60, 130** y el elemento de acoplamiento **16**, **D2** es igual a cero.) **D2** es preferiblemente menor de cinco veces **D1**, más preferiblemente menor de dos veces **D1** y, muy preferiblemente, menor de **D1**.

[0038] Como otra medida de lo reducido del tamaño longitudinal de los diseños ilustrados, el centro de masas del elemento de enganche se posiciona cerca de la pared de la segunda parte lo más lejos del vástago de impulsión, cuando el elemento de enganche está en la posición de reposo. Con referencia a FIGS 1 y 3, el centro de masas **92, 182** del elemento de enganche **50, 110** se separa por una distancia longitudinal **D3** de la pared **94, 184** de la segunda parte **14** lo más lejos del vástago de impulsión **28** que cruza el eje **30**, respectivamente. Preferiblemente **D3** es menor de ocho veces **D1** (FIGS. 2 y 4, respectivamente), más preferiblemente menor de cinco veces **D1** y, muy preferiblemente, menor de tres veces **D1**.

[0039] A todo lo largo de esta descripción y en las reivindicaciones anexas, tienen que entenderse las siguientes definiciones:



[0040] El término "acoplado" y varias formas del mismo tienen como finalidad abarcar, en sentido amplio, un acoplamiento tanto directo como indirecto. Por consiguiente, se dice que una primera parte está acoplada a una segunda parte cuando las dos partes están directamente acopladas (por ejemplo, por contacto directo o engrane funcional directo), así como cuando la primera parte está funcionalmente engranada con una parte intermedia que, a su vez, está funcionalmente engranada, directamente o mediante una o más partes intermedias adicionales, con la segunda parte. De igual manera, se dice que dos partes están acopladas cuando están funcionalmente engranadas (directa o indirectamente) en algunos momentos y no funcionalmente engranadas en otros momentos.

[0041] El término "enganchar" y varias de sus formas, cuando se emplean con referencia a la retención de una conexión de herramienta, se refieren a la aplicación de fuerzas de cualquier tipo, que tiendan a sujetar conjuntamente una herramienta y una conexión de herramienta contra fuerzas de separación inadvertidas o indeseadas (por ejemplo, como las que pueden introducirse durante el uso de la herramienta). Hay que entender, sin embargo que, enganche no requiere en todos los casos una conexión de enclavamiento, que se mantenga contra todo tipo concebible o magnitud de fuerza separadora.

[0042] Las designaciones "superior" e "inferior", usadas en referencia a elementos mostrados en los dibujos, se aplican simplemente con fines de conveniencia de la descripción. Estas designaciones no tienen que interpretarse como absolutas o limitantes y pueden invertirse. Por razones de claridad, a menos que se anote lo contrario, el término "superior" se refiere generalmente al lado de un elemento que está más alejado de un extremo de acoplamiento, tal como un vástago de impulsión. Adicionalmente, a menos que se anote lo contrario, el término "inferior" se refiere generalmente al lado de un elemento que está más próximo al extremo de acoplamiento.

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[0043] El término "longitudinal" se refiere a direcciones que son generalmente paralelas a la dirección de longitud del vástago de impulsión. En las incorporaciones descritas anteriormente, la dirección longitudinal es generalmente paralela al eje longitudinal 30.

[0044] El término "elemento" incluye tanto componentes mono-parte como componentes multi-parte. En consecuencia, un elemento puede constar de dos o más componentes separados, que cooperan para realizar la función del elemento.

[0045] Tal como se emplea en esta solicitud, el movimiento de un elemento hacia una posición (por ejemplo; enganche o liberación) o hacia un componente particular (por ejemplo, hacia un vástago de impulsión o alejándose de él) incluye toda clase de movimientos longitudinales, movimientos sesgados, movimientos de rotación y combinaciones de los mismos.

[0046] El término "movimiento relativo", como se aplica a la traslación entre dos partes, se refiere a cualquier movimiento mediante el cual el centro de masas de una parte se mueve en relación con el centro de masas de otra parte.

[0047] Tal como se emplea en esta solicitud, el término "elemento de empuje" se refiere a cualquier mecanismo que ejerce una fuerza de empuje. Elementos de empuje representativos incluyen, sin limitación, resortes (por ejemplo, resortes elastoméricos o metálicos, resortes de torsión, resortes helicoidales, resortes de lámina, resortes de tensión, resortes de compresión, resortes de extensión, resortes de espiral, resortes de voluta, resortes planos, y similares), seguros (por ejemplo, bolas de bloqueo con carga de resorte, conos, cuñas, cilindros, y similares), mecanismos neumáticos, mecanismos hidráulicos, y similares, y combinaciones de los

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mismos.

[0048] Las herramientas descritas anteriormente se caracterizan en grados diferentes por algunos o la totalidad de los siguientes rasgos: construcción sencilla; un pequeño número de partes de fácil fabricación; acceso fácil a un operador que usa la herramienta en un espacio de trabajo estrecho y/o restringido; construcción robusta, durable y confiable; y capacidad de acomodar varias conexiones de herramienta, incluidas las que tienen tamaños y configuraciones diferentes de depresiones, diseñadas para alojar un seguro; auto-ajuste para contrarrestar el desgaste; eliminación sustancial de requerimientos de alineación precisa de cualquier tipo; fácil limpieza; un mínimo de superficies cortantes; sobresalen de la herramienta en una magnitud pequeña; y poseen un tramo longitudinal corto.

[0049] Los mecanismos ilustrados en los dibujos incluyen elementos actuadores con una dimensión máxima de sección transversal, que es sólo ligeramente mayor que la de la segunda parte, en la cual se montan. Tal elemento actuador ofrece varias ventajas. Puesto que el elemento actuador tiene un diámetro exterior pequeño, la herramienta resultante es compacta y se usa fácilmente en espacios estrechos. Además, el elemento actuador está menos sujeto a moverse accidentalmente a la posición liberadora durante el uso, porque presenta una sección transversal más pequeña que muchas conexiones de herramienta.

[0050] Naturalmente, debe entenderse que pueden introducirse una amplia gama de cambios y modificaciones a las incorporaciones preferidas, descritas anteriormente. Por ejemplo, el elemento actuador puede emplear únicamente un brazo inclinado en lugar del par de brazos inclinados, opuestos, ilustrados. Además, por razones de conveniencia, se han descrito varias posiciones de los elementos de enganche y los elemento actuadores. Se entenderá, naturalmente, que el término "posición" tiene como fin abarcar una gama de posiciones, como es apropiado para conexiones de

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herramientas que tienen depresiones y diámetros internos de diferentes formas y dimensiones.

[0051] Se contempla, en consecuencia, que la anterior descripción detallada se considere más ilustrativa que limitante, y se entiende que son las siguientes reivindicaciones, incluidos todos los equivalentes, las que tienen como finalidad definir el ámbito de esta invención.

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REIVINDICAMOS

1. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte orientada en un ángulo oblicuo con respecto a un eje longitudinal central del vástago de impulsión;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta cuando está en una posición de enganche, y para soltar la conexión de herramienta cuando está en una posición liberadora;

un elemento actuador acoplado con el elemento de enganche, de modo que el movimiento longitudinal del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

atravesando el citado elemento actuador el eje longitudinal central.

2. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte orientada en un ángulo oblicuo con respecto a un eje longitudinal central del vástago de impulsión;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta cuando está en una posición de enganche y para

soltar la conexión de herramienta cuando está en una posición liberadora;

un elemento actuador acoplado con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

incluyendo la citada segunda parte por lo menos dos proyecciones portadoras de carga configuradas para participar en transmisión de fuerza de torsión entre el elemento de acoplamiento y la segunda parte, extendiéndose por lo menos parte del citado elemento actuador entre las proyecciones portadoras de carga en por lo menos algunas posiciones del elemento actuador.

3. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte orientada en un ángulo oblicuo con respecto a un eje longitudinal central del vástago de impulsión;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

un elemento actuador acoplado con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

cooperando el citado elemento de acoplamiento y la citada segunda parte para formar una abertura, extendiéndose por lo menos parte del citado elemento actuador en la abertura en por lo menos algunas posiciones del elemento actuador.

4. La invención de la reivindicación 1, 2, ó 3 en donde el elemento actuador comprende una camisa que se extiende alrededor de la segunda parte.
5. La invención de la reivindicación 1, 2, ó 3 en donde elemento de enganche se desplaza a lo largo de una primera dirección en la guía, en donde el elemento actuador comprende una superficie de soporte cerca del elemento de enganche, y en donde la superficie de soporte se orienta no paralela a la primera dirección y no paralela al eje longitudinal central.
6. La invención de la reivindicación 5 en donde la superficie de soporte se orienta sustancialmente en forma perpendicular a la primera dirección.
7. La invención de la reivindicación 1 ó 3 en donde la segunda parte comprende dos brazos distanciados, posicionados en lados respectivos del elemento de acoplamiento, y en donde por lo menos alguna parte del elemento actuador se extiende entre los dos brazos distanciados, en por lo menos algunas posiciones del elemento actuador, con respecto a la segunda parte.
8. La invención de la reivindicación 5 en donde el elemento de enganche comprende una segunda superficie de soporte posicionada para enganchar la superficie de soporte, mencionada en primer lugar, del elemento actuador.
9. La invención de la reivindicación 1, 2, ó 3 en donde el elemento actuador es accesible desde una periferia de la segunda parte y atraviesa el eje longitudinal central.
10. La invención de la reivindicación 1, 2, ó 3 en donde el citado elemento actuador comprende una porción periférica y una porción central, orientada la citada porción periférica por lo menos en parte en un ángulo

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oblicuo con respecto al eje longitudinal central del vástago de impulsión para desplazar la citada porción central lejos del vástago de impulsión a lo largo del eje longitudinal central.

11. La invención de la reivindicación 10 en donde la porción periférica comprende un primer brazo inclinado, que se extiende en un ángulo oblicuo lejos de la porción central.

12. La invención de la reivindicación 11 en donde la porción periférica comprende además un segundo brazo inclinado, que se extiende en un ángulo oblicuo lejos de la porción central.

13. La invención de la reivindicación 12 en donde los brazos primero y segundo se posicionan en lados opuestos de la porción central.

14. La invención de la reivindicación 10 en donde el elemento actuador se acopla al elemento de enganche en la porción periférica.

15. La invención de la reivindicación 1, 2, ó 3 que comprende además un elemento de empuje que funciona para presionar el elemento actuador a una posición de reposo mientras permanece libre de enganche con el elemento de acoplamiento.

16. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte;

un elemento de enganche montado con posibilidad de movimiento en

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la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

un elemento actuador acoplado con el elemento de enganche, de modo que el movimiento longitudinal del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

comprendiendo el citado elemento actuador una porción periférica y una porción central, posicionada la citada porción periférica lejos del vástago de impulsión y orientada por lo menos en parte en un ángulo oblicuo con respecto a un eje longitudinal central del vástago de impulsión;

atravesando el citado elemento actuador el eje longitudinal central.

17. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

un elemento actuador acoplado con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

comprendiendo el citado elemento actuador una porción periférica y una porción central, posicionada la citada porción periférica lejos del vástago de impulsión y orientada por lo menos en parte en un ángulo oblicuo con respecto a un eje longitudinal central del vástago de impulsión;

incluyendo la citada segunda parte por lo menos dos proyecciones

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portadoras de carga configuradas para participar en transmisión de fuerza de torsión entre el elemento de acoplamiento y la segunda parte, extendiéndose por lo menos parte del citado elemento actuador entre las proyecciones portadoras de carga en por lo menos algunas posiciones del elemento actuador.

18. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

- una guía en la segunda parte;

- un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

- un elemento actuador acoplado con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

- comprendiendo el citado elemento actuador una porción periférica y una porción central, posicionada la citada porción periférica lejos del vástago de impulsión y orientada por lo menos en parte en un ángulo oblicuo con respecto a un eje longitudinal central del vástago de impulsión;

- cooperando el citado elemento de acoplamiento y la citada segunda parte para formar una abertura, extendiéndose por lo menos parte del citado elemento actuador en la abertura en por lo menos algunas posiciones del elemento actuador.

19. La invención de la reivindicación 16, 17, ó 18 en donde el elemento actuador comprende una camisa que se extiende alrededor de la segunda

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parte.

20. La invención de la reivindicación 16, 17, ó 18 en donde la porción central se aleja del vástago de impulsión, a lo largo del eje longitudinal central, por la porción periférica.

21. La invención de la reivindicación 19 en donde la camisa se centra en un primer plano, orientado transversalmente al eje longitudinal del vástago de impulsión, cuando el elemento actuador está en una primera posición con respecto a la segunda parte.

22. La invención de la reivindicación 21 en donde la porción central se centra en un segundo, plano orientado transversalmente al eje longitudinal, cuando el elemento actuador está en la primera posición.

23. La invención de la reivindicación 22 en donde el vástago de impulsión y el segundo plano se posicionan en lados opuestos del primer plano.

24. La invención de la reivindicación 19 en donde la porción periférica comprende un primer brazo inclinado, que se extiende en un ángulo oblicuo entre la camisa y la porción central.

25. La invención de la reivindicación 24 en donde la porción periférica comprende además un segundo brazo inclinado, que se extiende en un ángulo oblicuo entre la camisa y la porción central.

26. La invención de la reivindicación 25 en donde los brazos primero y segundo se posicionan en lados opuestos de la porción central.

27. La invención de la reivindicación 16, 17, ó 18 en donde el elemento actuador se acopla al elemento de enganche en la porción central.

28. La invención de la reivindicación 16, 17, ó 18 en donde el elemento actuador se acopla al elemento de enganche en la porción periférica.

29. La invención de la reivindicación 16 ó 18 en donde la segunda parte comprende dos brazos distanciados, posicionados en lados respectivos del elemento de acoplamiento, y en donde por lo menos alguna parte del elemento actuador se extiende entre los dos brazos distanciados, en por lo menos algunas posiciones del elemento actuador con respecto a la segunda parte.

30. La invención de la reivindicación 16, 17, ó 18 que comprende además un elemento de empuje que opera para presionar el elemento actuador hacia una posición de reposo, permaneciendo al mismo tiempo libre de enganche con el elemento de acoplamiento.

31. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte, incluyendo la citada guía un pasaje interno en el vástago de impulsión orientado en un ángulo menor de 80 grados con respecto a un eje longitudinal central del vástago de impulsión;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora; y

un elemento actuador que comprende una camisa que se extiende alrededor de la segunda parte;

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acoplado el citado elemento actuador con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

pudiéndose mover el citado elemento actuador con respecto a la segunda parte en una carrera con un tramo longitudinal **D1**, y configurándose la citada segunda parte de tal modo que, con el acercamiento máximo, el más próximo del elemento actuador y el elemento de enganche se acerque al elemento de acoplamiento hasta una distancia longitudinal **D2**, en donde **D2** es menor de cinco veces **D1**.

32. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte, incluyendo la citada guía un pasaje interno en el vástago de impulsión orientado en un ángulo menor de 80 grados con respecto a un eje longitudinal central del vástago de impulsión;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora, definiendo el citado elemento de enganche un centro de masas; y

un elemento actuador que comprende una camisa que se extiende alrededor de la segunda parte;

acoplado el citado elemento actuador con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

pudiéndose mover el citado elemento actuador con respecto a la segunda parte en una carrera con un tramo longitudinal **D1**, comprendiendo

la citada segunda parte una pared que atraviesa el eje longitudinal central lo más alejado del vástago de impulsión, distanciándose el citado centro de masas de la pared por una distancia longitudinal **D3**, cuando el elemento de enganche está en una posición de reposo, en donde **D3** es menor de ocho veces **D1**.

33. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

- una guía en la segunda parte, incluyendo la citada guía un pasaje interno en el vástago de impulsión orientado en un ángulo menor de 80 grados con respecto a un eje longitudinal central del vástago de impulsión;

- un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora; y

- un elemento actuador que comprende una camisa que se extiende alrededor de la segunda parte;

- acoplado el citado elemento actuador con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

- incluyendo la citada segunda parte por lo menos dos proyecciones portadoras de carga configuradas para participar en transmisión de fuerza de torsión entre el elemento de acoplamiento y la segunda parte, extendiéndose por lo menos parte del citado elemento actuador entre las proyecciones portadoras de carga en por lo menos algunas posiciones del elemento actuador.

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34. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte, incluyendo la citada guía un pasaje interno en el vástago de impulsión orientado en un ángulo menor de 80 grados con respecto a un eje longitudinal central del vástago de impulsión;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora; y

un elemento actuador que comprende una camisa que se extiende alrededor de la segunda parte;

acoplado el citado elemento actuador con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche;

cooperando el citado elemento de acoplamiento y la citada segunda parte para formar una abertura, extendiéndose por lo menos parte del citado elemento actuador en la abertura en por lo menos algunas posiciones del elemento actuador.

35. La invención de la reivindicación 31, 32, 33, ó 34 en donde el pasaje interno se orienta sustancialmente paralelo al eje longitudinal central.

36. La invención de la reivindicación 31, 32, 33, ó 34 en donde el pasaje interno se orienta en un ángulo oblicuo al eje longitudinal central.

37. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte,

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una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

un elemento actuador accesible desde una periferia del segundo elemento y que cruza un eje longitudinal central de la segunda parte, comprendiendo el citado elemento actuador una camisa que se extiende alrededor de la segunda parte;

acoplado el citado elemento actuador con el elemento de enganche de modo que el movimiento longitudinal del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche; y

un elemento de empuje que opera para presionar el elemento actuador hacia una posición de reposo independientemente de cualquier reacción contra el elemento de acoplamiento;

pudiéndose mover el citado elemento actuador con respecto a la segunda parte en una carrera con un tramo longitudinal **D1**, y configurándose la citada segunda parte de tal modo que, con el acercamiento máximo, el más próximo del elemento actuador y el elemento de enganche se acerque al elemento de acoplamiento hasta una distancia longitudinal **D2**, en donde **D2** es menor de cinco veces **D1**.

38. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda,

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configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

una guía en la segunda parte;

un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora, comprendiendo el citado elemento de enganche un centro de masas;

un elemento actuador accesible desde una periferia del segundo elemento y que cruza un eje longitudinal central de la segunda parte, comprendiendo el citado elemento actuador una camisa que se extiende alrededor de la segunda parte;

acoplado el citado elemento actuador con el elemento de enganche, de modo que el movimiento longitudinal del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche; y

un elemento de empuje que opera para presionar el elemento actuador hacia una posición de reposo independientemente de cualquier reacción contra el elemento de acoplamiento;

pudiéndose mover el citado elemento actuador con respecto a la segunda parte en una carrera con un tramo longitudinal **D1**, comprendiendo la citada segunda parte una pared que atraviesa el eje longitudinal central lo más lejos del vástago de impulsión, distanciado el citado centro de masas de la pared por una distancia **D3** cuando el elemento de enganche está en una posición de reposo, en donde **D3** es menor de ocho veces **D1**.

39. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para

transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

- una guía en la segunda parte;

- un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

- un elemento actuador accesible desde una periferia del segundo elemento y que atraviesa un eje longitudinal central de la segunda parte, comprendiendo el citado elemento actuador una camisa que se extiende alrededor de la segunda parte;

- acoplado el citado elemento actuador con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche; y

- un elemento de empuje que opera para presionar el elemento actuador hacia una posición de reposo independientemente de cualquier reacción contra el elemento de acoplamiento;

- incluyendo la citada segunda parte por lo menos dos proyecciones portadoras de carga configuradas para participar en transmisión de fuerza de torsión entre el elemento de acoplamiento y la segunda parte, extendiéndose por lo menos parte del citado elemento actuador entre las proyecciones portadoras de carga en por lo menos algunas posiciones del elemento actuador.

40. En una junta universal para uso con una herramienta de transmisión de fuerza de torsión, la citada junta universal comprende una primera parte, una segunda parte que incluye un vástago de impulsión, y por lo menos un elemento de acoplamiento acoplado entre las partes primera y segunda, configurado el citado por lo menos un elemento de acoplamiento para transmitir fuerza de torsión entre las partes primera y segunda, mejora que comprende:

- una guía en la segunda parte;

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un elemento de enganche montado con posibilidad de movimiento en la guía para proyectarse fuera del vástago de impulsión y enganchar una conexión de herramienta, cuando está en una posición de enganche, y soltar la conexión de herramienta, cuando está en una posición liberadora;

un elemento actuador accesible desde una periferia del segundo elemento y que cruza un eje longitudinal central de la segunda parte, comprendiendo el citado elemento actuador una camisa que se extiende alrededor de la segunda parte;

acoplado el citado elemento actuador con el elemento de enganche, de tal modo que el movimiento del elemento actuador, con respecto a la segunda parte, resulte en movimiento del elemento de enganche; y

un elemento de empuje que opera para presionar el elemento actuador hacia una posición de reposo independientemente de cualquier reacción contra el elemento de acoplamiento;

cooperando el citado elemento de acoplamiento y la citada segunda parte para formar una abertura, extendiéndose por lo menos parte del citado elemento actuador en la abertura en por lo menos algunas posiciones del elemento actuador.

41. La invención de la reivindicación 37, 38, 39, ó 40 en donde el elemento de empuje se dispone en la guía.

42. La invención de la reivindicación 37, 38, 39, ó 40 en donde el elemento de empuje se dispone de manera sustancial completamente en la segunda parte.

43. La invención de la reivindicación 37, 38, 39, ó 40 en donde el elemento de empuje se dispone alrededor del elemento de enganche.

44. La invención de la reivindicación 37, 38, 39, ó 40 en donde el elemento de empuje se caracteriza por un centro de masas, y en donde el centro de masas se posiciona en la segunda parte en por lo menos algunas

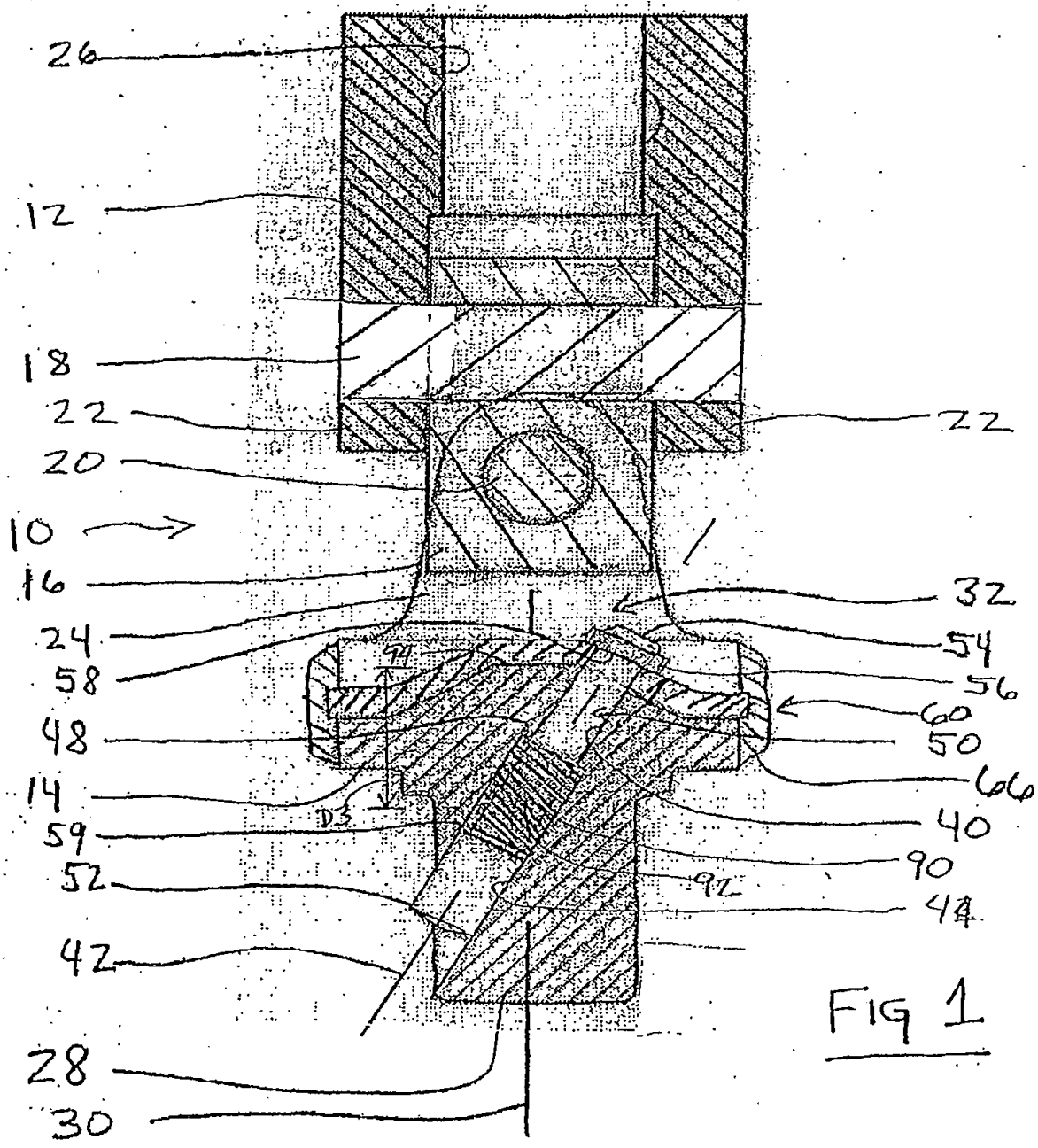
76

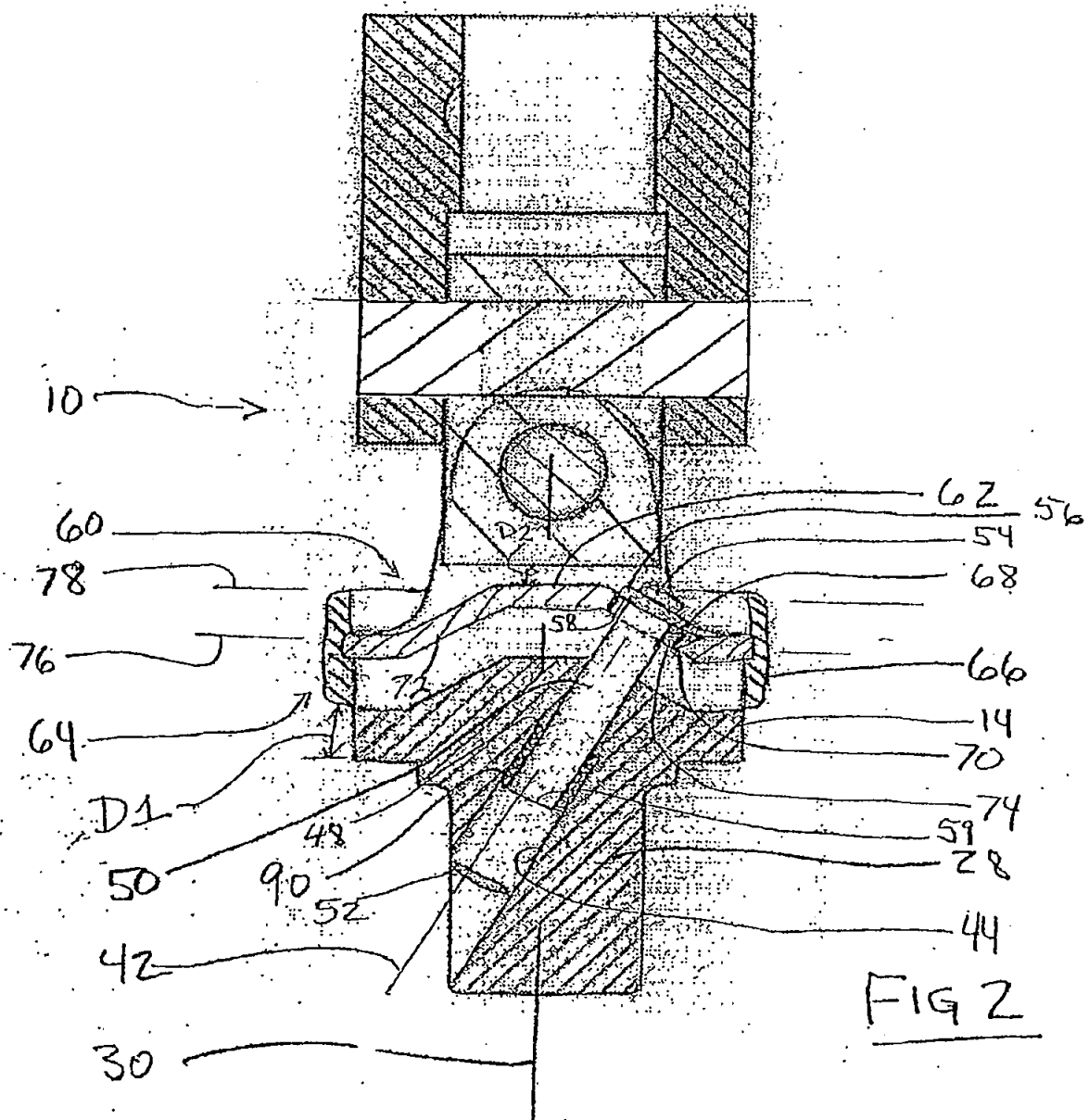
posiciones del elemento actuador.

45. La invención de la reivindicación 37, 38, 39, ó 40 en donde el citado elemento actuador se puede mover longitudinalmente a posiciones cada vez más externas a la segunda parte.

46. La invención de la reivindicación 37, 38, ó 40 en donde la segunda parte comprende dos brazos distanciados en lados respectivos del elemento de acoplamiento, y en donde por lo menos alguna parte del elemento actuador se extiende entre los dos brazos distanciados, en por lo menos algunas posiciones del elemento actuador con respecto a la segunda parte.

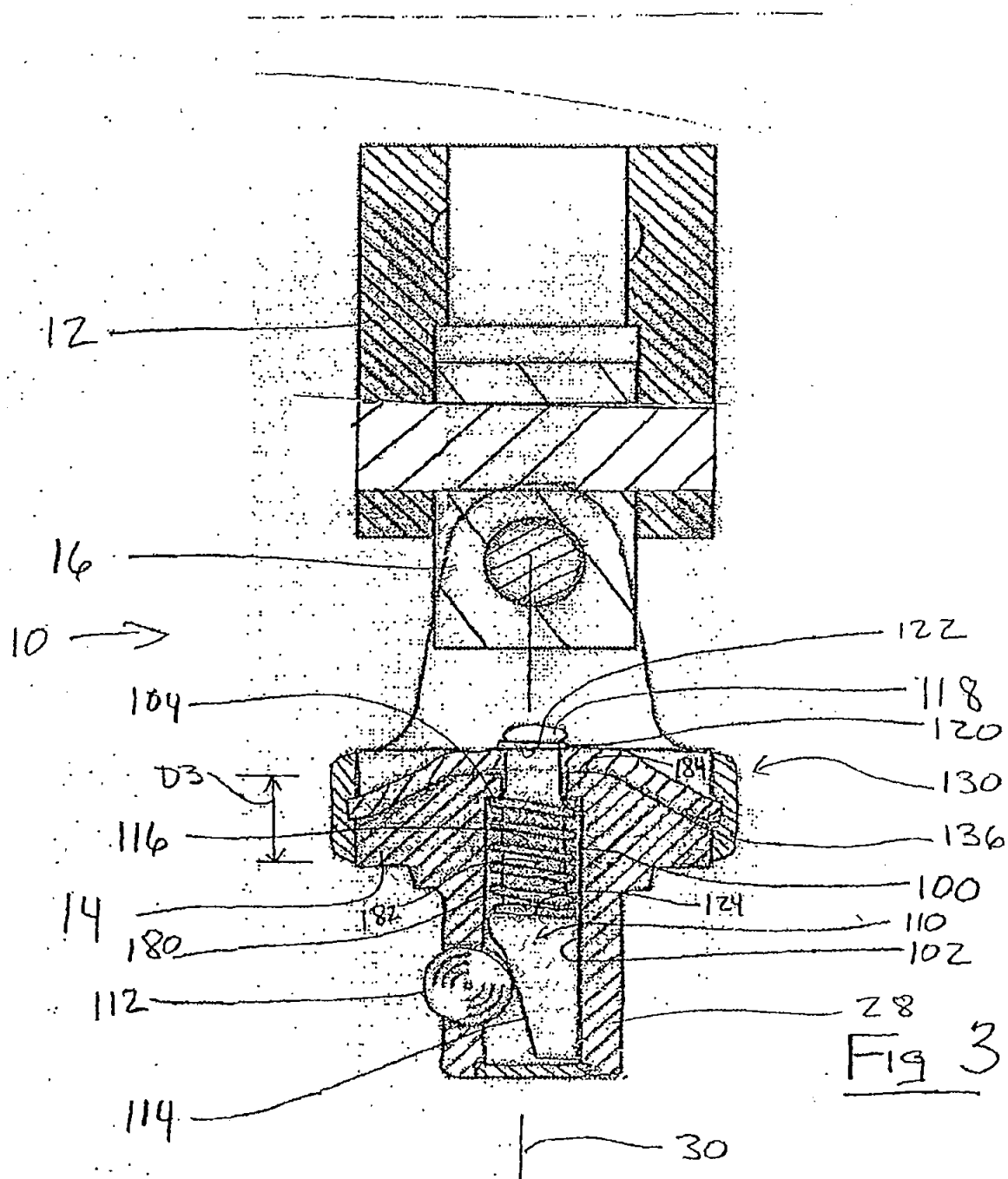
75





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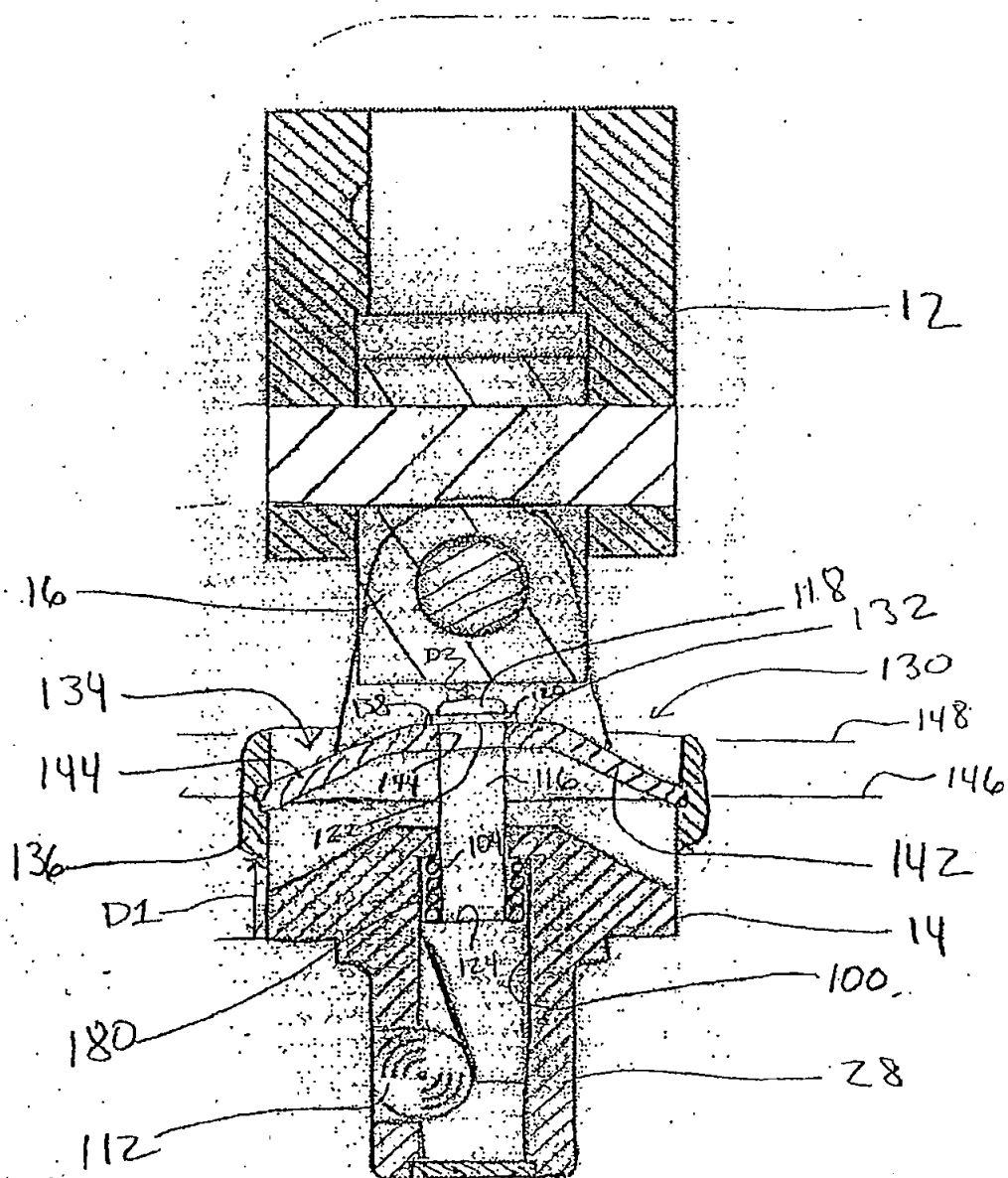


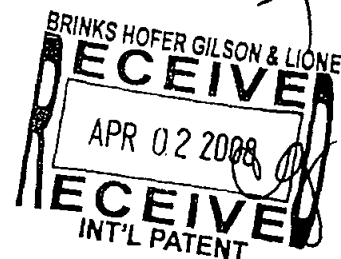
FIG 4

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: Gregory H. Zayia
Brinks Hofer Gilson & Lione
P.O. Box 10087
Chicago, Illinois 60610

PCT



NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 742-309	Date of mailing (day/month/year) 27 MAR 2008
International application No. PCT/US 07/11344	International filing date (day/month/year) 10 May 2007 (10.05.2007)
Applicant: Joda Enterprises, Inc.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

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Applicant's or agent's file reference 742-309	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 07/11344	International filing date (day/month/year) 10 May 2007 (10.05.2007) (Earliest) Priority Date (day/month/year) 02 June 2006 (02.06.2006)
Applicant Joda Enterprises, Inc.	

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 2
☐ as suggested by the applicant.
☒ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/11344

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B25B 23/16 (2007.10)

USPC - 81/177.85

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8): B25B23/16 (2007.10)

USPC: 81/177.85

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC(8): B25B23/16 (2007.10)

USPC: 81/177.75, 177.85; 403/74, 322.1, 324, 325, 326, 328, 355

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST(USPT,PGPB,EPAB,JPAB); Internet search via Google Web and Google Scholar search engines. Search Terms Used:
universal joint tool engage torque couple actuate drive axis collar pin lock engage release slide movement bias spring mode position
angle degree distance length load guide perpendicular oblique

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,433,548 A (ROBERTS et al.) 18 July 1995 (18.07.1995) col. 1 ln. 6 to col. 6 ln. 23, Fig. 1-14	31-35 and 37-46
Y		1-30 and 36
Y	US 5,233,892 A (ROBERTS) 10 August 1993 (10.08.1993) col. 1 ln. 6 to col. 6 ln. 11, Fig 1-6	1-30 and 36
A	US 6,044,730 A (ROBERTS et al.) 04 April 2000 (04.04.2000) col. 1 ln. 49 to col. 8 ln. 16, Fig. 1-10	1-46
A	US 5,644,958 A (ROBERTS et al.) 08 July 1997 (08.07.1997) col. 1 ln. 15 to col. 6 ln. 8, Fig. 1-5	1-46
A	US 6,145,416 A (BONNIOT) 14 November 2000 (14.11.2000) col. 6 ln. 28 to col. 7 ln. 7, Fig. 8, 12	1-46
A	US 5,911,800 A (ROBERTS et al.) 15 June 1999 (15.06.1999) col. 1 ln. 14 to col. 6 ln. 8, Fig. 1-6	1-46

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 December 2007 (10.12.2007)

Date of mailing of the international search report

27 MAR 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: Gregory H. Zayia
Brinks Hofer Gilson & Lione
P.O. Box 10087
Chicago, Illinois 60610

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year) 27 MAR 2008	
Applicant's or agent's file reference 742-309	FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/US 07/11344	International filing date (day/month/year) 10 May 2007 (10.05.2007)
Priority date (day/month/year) 02 June 2006 (02.06.2006)	
International Patent Classification (IPC) or both national classification and IPC IPC(8) - B25B 23/16 (2007.10) USPC - 81/177.85	
Applicant Joda Enterprises, Inc.	

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Date of completion of this opinion 11 December 2007 (11.12.2007)	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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Form PCT/ISA/237 (cover sheet) (April 2007).

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 07/11344

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of:
 - a. type of material
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing
 - ☐ contained in the international application as filed
 - ☐ filed together with the international application in electronic form
 - ☐ furnished subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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INTERNATIONAL SEARCHING AUTHORITY**

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-30,32,35/(32),36,38, (41-46)/(38)	YES
	Claims	see below	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-46	NO
Industrial applicability (IA)	Claims	1-46	YES
	Claims	none	NO

2. Citations and explanations:

Novelty (NO) 31,33,34,35/(31,33-34),37,39-40,(41-45)/(37,39-40),46/(37,40)

Claims 31, 33, 34, 35/(31,33-34), 37, 39-40, 41/(37,39-40), 42/(37,39-40), 43/(37,39-40), 44/(37,39-40), 45/(37,39-40) and 46/(37,40) lack novelty under PCT Article 33(2) as being anticipated by US 5,433,548 A to Roberts et al. (hereinafter Roberts 548).

Regarding claim 31, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees (bore 61 is oriented at an angle of 00 degrees) with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing-position (Fig. 5) and an actuating element (actuator 80) comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part, said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element (actuator 80) movable with respect to the second part (second part 20) through a stroke having a longitudinal length D1 (distance between upper surface of actuator 80 and lower portion of coupling element 32) and said second part (second part 20) configured such that at closest approach the closer of the actuating element (actuator 80) and the engaging element (linking element 60, socket engaging element 50) approaches the coupling element (coupling element 32) to within a longitudinal distance D2, wherein D2 is less than five times D1 (from inspection of Fig. 3, 5 upper surface of actuator 80 may approach the lower portion of coupling element 32, wherein D2 is zero).

Regarding claim 33, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees (bore 61 is oriented at an angle of 00 degrees) with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5), and an actuating element (actuator 80) comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part (Fig. 3-5), the actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element (Fig. 5), the second part comprising at least two load-bearing protrusions (parallel arms 26, fig 1) configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element (actuator 80) extending between the load-bearing protrusions (parallel arms 26, Fig. 4) for at least some positions of the actuating element.

Regarding claim 34, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part, said guide comprising an internal passageway (stepped bore 61) in the drive stud oriented at an angle of less than 80 degrees (bore 61 is oriented at an angle of 00 degrees) with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5) and an actuating element (actuator 80) comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part (Fig. 4); said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said coupling element and said second part cooperating to form an aperture (second joint portion 24, col. 3 ln. 1-13, Fig. 1, 3-5) at least part of said actuating element extending into the aperture for at least some positions of the actuating element.

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Regarding claim 35/(31,33-34), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-5) wherein the

Regarding claim 37, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5) an actuating element (actuator 80) accessible from a periphery (peripheral area of second element 20) of the second element (Fig. 1, 3-5) and crossing a central longitudinal axis (axis 30) of the second part, said actuating element comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part; said actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element (Fig. 5); and a biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) operative to bias the actuating element toward a rest position (Fig. 3) independently of any reaction against the coupling element; said actuating element movable with respect to the second part through a stroke having a longitudinal length D1 (distance between upper surface of actuator 80 and lower portion of coupling element 32), and said second part configured such that at closest approach the closer of the actuating element and the engaging element approaches the coupling element to within a longitudinal distance D2, wherein D2 is less than five times D1 (from inspection of Fig. 3, 5 upper surface of actuator 80 may approach the lower portion of coupling element 32, wherein D2 is zero).

Regarding claim 39, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5), an actuating element (actuator 80) accessible from a periphery (peripheral area of second element 20) of the second element and crossing a central longitudinal axis (axis 30) of the second part, said actuating element comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part; said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element (Fig. 5) and a biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) operative to bias the actuating element toward a rest position (Fig. 3) independently of any reaction against the coupling element; said second part comprising at least two load-bearing protrusions (parallel arms 26, fig 1) configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element (actuator 80, Fig. 3-5) extending between the load-bearing protrusions for at least some positions of the actuating element.

Regarding claim 40, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position and to release the tool attachment when in a releasing position (Fig. 5) an actuating element (actuator 80, peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) accessible from a periphery (peripheral portion of second part 20) of the second element and crossing a central longitudinal axis (axis 30) of the second part, said actuating element comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part; said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element (Fig. 5); and a biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) operative to bias the actuating element toward a rest position (Fig. 3) independently of any reaction against the coupling element; said coupling element and said second part cooperating to form an aperture (second joint portion 24, col. 3 ln. 1-13, Fig. 1, 3-5), at least part of said actuating element extending into the aperture for at least some positions of the actuating element (Fig. 3-5).

Regarding claim 41/(37,39-40), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) is disposed in the guide (stepped bore 61).

Regarding claim 42/(37,39-40), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) is disposed substantially entirely within the second part (second part 20).

Regarding claim 43/(37,39-40), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) is disposed around the engaging element (linking element 60, socket engaging element 50).

Regarding claim 44/(37,39-40), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) is characterized by a center of mass (a center of mass inherently exists for spring 70, illustrated, not disclosed), and wherein the center of mass is positioned within the second part for at least some positions of the actuating element (due to location of spring 70 entirely within second part, the center of mass of spring must also be situated within second part).

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Regarding claim 45/(37,39-40), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein said actuating element (actuator 80, Fig. 3-5) is movable longitudinally to positions increasingly external to the second part (second part 20, Fig. 5).

Regarding claim 46/(37,40), Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the second part (second part 20, Fig. 1, 3-5) comprises two spaced arms (parallel arms 26) positioned on respective sides of the coupling element (coupling element 32) and wherein at least some part of the actuating element (central portion of actuator 80) extends between the two spaced arms (Fig. 1,3-5), for at least some positions (Fig. 3, 5) of the actuating element with respect to the second part.

Claims 32, 35/(32), 38, 41/(38), 42/(38), 43/(38), 44/(38), 45/(38) and 46/(38) lack an inventive step under PCT Article 33(3) as being obvious over Roberts 548.

Regarding claim 32, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part, said guide comprising an internal passageway in the drive stud oriented at an angle of less than 80 degrees (bore 61 is oriented at an angle of 00 degrees) with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing-position (Fig. 5), said engaging element defining a center of mass (center of mass of linking element 60 inherently exists, yet is not disclosed) and an actuating element (actuator 80) comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part (Fig. 3-5); said actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element (Fig. 5) said actuating element movable with respect to the second part through a stroke having a longitudinal length D1 (distance between upper surface of actuator 80 and lower portion of coupling element 32), said second part (second part 20) comprising a wall (step of stepped bore 61, Fig. 3, 5) crossing the central longitudinal axis farthest from the drive stud, said center of mass spaced from the wall by a longitudinal distance D3 (distance between center of mass of linking element 60 and step of stepped bore, Fig. 5) when the engaging element is in a rest position (Fig. 5) yet fails to disclose wherein D3 is less than eight times D1. However, the relative dimensioning of engaging elements are well known to the industry, it would have been obvious to one of ordinary skill in the art to modify the engaging element (linking element 60) of Roberts 548 such that the center of mass of the engaging element spaced from the wall by a longitudinal distance D3 when the engaging element is in a rest position wherein D3 is less than eight times D1, since such would have been a matter of design choice.

Regarding claim 35/(32), please refer to the discussion above for claims 35/(31,33-34).

Regarding claim 38, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5) said engaging element comprising a center of mass (center of mass of linking element 60 inherently exists, yet is not disclosed), an actuating element (actuator 80) accessible from a periphery of the second element (peripheral area of second element 20) and crossing a central longitudinal axis (axis 30) of the second part, said actuating element comprising a collar (peripheral gripping portions 84, Fig. 4) extending around the second part; said actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element (Fig. 5) and a biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) operative to bias the actuating element toward a rest position (Fig. 3) independently of any reaction against the coupling element; said actuating element movable with respect to the second part through a stroke (Fig. 5) having a longitudinal length D1 (distance between upper surface of actuator 80 and lower portion of coupling element 32), said second part comprising a wall (step of stepped bore 61, Fig. 3, 5) crossing the central longitudinal axis farthest from the drive stud, said center of mass spaced from the wall by a distance D3 (distance between center of mass of linking element 60 and step of stepped bore, Fig. 5) when the engaging element is in a rest position (Fig. 3), yet fails to disclose wherein D3 is less than eight times D1. However, the relative dimensioning of engaging elements are well known to the industry, it would have been obvious to one of ordinary skill in the art to modify the engaging element (linking element 60) of Roberts 548 such that the center of mass of the engaging element spaced from the wall by a longitudinal distance D3 when the engaging element is in a rest position wherein D3 is less than eight times D1, since such would have been a matter of design choice.

Regarding claim 41/(38), please refer to the discussion above for claims 41/(37,39-40).

Regarding claim 42/(38), please refer to the discussion above for claims 42/(37,39-40).

Regarding claim 43/(38), please refer to the discussion above for claims 43/(37,39-40).

Regarding claim 44/(38), please refer to the discussion above for claims 44/(37,39-40).

Regarding claim 45/(38), please refer to the discussion above for claims 45/(37,39-40).

Regarding claim 46/(38), please refer to the discussion above for claims 46/(37,40).
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Claims 1-30 and 36 lack an inventive step under PCT Article 33(3) as being obvious over Roberts 548 in view of US 5,233,892 A (Roberts) (hereinafter Roberts 892).

Regarding claim 1, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part parallel with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-13) when in an engaging position (col. 3 ln. 67 to col. 4 ln. 27, Fig. 3) and to release the tool attachment when in a releasing position (col. 3 ln. 67 to col. 4 ln. 27, Fig. 5), an actuating element (actuator 80) coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element crossing the central longitudinal axis (Fig. 1, 3-5), yet fails to disclose wherein the guide in the second part is oriented at an oblique angle with respect to a central longitudinal axis of the drive stud. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising a coupling element (extension bar E, col. 2 ln. 44-56, Fig. 5, 6), an actuating element (collar 34, col. 3 ln. 30-33), a second part (lower portion 12) and a guide (diagonally positioned opening 16, col. 2 ln. 57-66) oriented at an oblique angle with respect to a central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10). Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint for use with a torque transmitting tool said universal joint comprising a first part a second part comprising a drive stud and at least one coupling element coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud; an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing position, an actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element crossing the central longitudinal axis, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

Regarding claim 2, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68), said universal joint comprising a first part (first part 12, Fig. 3-5), a second part (second part 20) comprising a drive stud (drive stud 22), and at least one coupling element (coupling element 32) coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, comprising: a guide (stepped bore 61) in the second part oriented parallel with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-13) when in an engaging position (col. 3 ln. 67 to col. 4 ln. 27, Fig. 3) and to release the tool attachment when in a releasing position (col. 3 ln. 67 to col. 4 ln. 27, Fig. 5); an actuating element (actuator 80) coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said second part comprising at least two load-bearing protrusions (parallel arms 26) configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element extending between the load-bearing protrusions (Fig. 1) for at least some positions of the actuating element, yet fails to disclose a universal joint wherein the guide in the second part is oriented at an oblique angle with respect to a central longitudinal axis of the drive stud. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising a coupling element (extension bar E, col. 2 ln. 44-56, Fig. 5, 6), an actuating element (collar 34, col. 3 ln. 30-33), a second part (lower portion 12) and a guide (diagonally positioned opening 16, col. 2 ln. 57-66) oriented at an oblique angle with respect to a central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10). Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) and second part (lower portion 12) of Roberts 892 to construct a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, comprising: a guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud; an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing position; an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said second part comprising at least two load-bearing protrusions configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element extending between the load-bearing protrusions for at least some positions of the actuating element, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

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Regarding claim 3, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising: a guide (stepped bore 61) in the second part parallel with respect to a central longitudinal axis (axis 30) of the drive stud; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5), an actuating element (actuator 80) coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said coupling element and said second part cooperating to form an aperture (second joint portion 24, col. 3 ln. 1-13, Fig. 1, 3-5), at least part of said actuating element extending into the aperture for at least some positions of the actuating element, yet fails to disclose where the guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising a coupling element (extension bar E, col. 2 ln. 44-56, Fig. 5, 6), an actuating element (collar 34, col. 3 ln. 30-33), a second part (lower portion 12) and a guide (diagonally positioned opening 16, col. 2 ln. 57-66) oriented at an oblique angle with respect to a central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10). Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34), second part (lower portion 12) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, comprising: a guide in the second part oriented at an oblique angle with respect to a central longitudinal axis of the drive stud; an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing position; an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said coupling element and said second part cooperating to form an aperture, at least part of said actuating element extending into the aperture for at least some positions of the actuating element.

Regarding claim 4, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the actuating element (collar 34, col. 3 ln. 30-33) comprises a collar extending around the second part (lower portion 12, col. 2 ln. 11-66, col. 3 ln. 64 to col. 4 ln. 15).

Regarding claim 5, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein an engaging element (lower end 26 of pin 24, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1) moves along a first direction (opening axis 44) in the guide (diagonally positioned opening 16), wherein the actuating element comprises a support surface (sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 6) near the engaging element, and wherein the support surface is oriented non-parallel to the first direction and non-parallel to the central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52).

Regarding claim 6, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the support surface (sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1) is oriented substantially perpendicularly to the first direction (opening axis 44).

Regarding claim 7, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the second part (second part 20) comprises two spaced arms (second arms 26, col. 3 ln. 1-24, 57-66, Fig. 1) positioned on respective sides of the coupling element (coupling element 32), and wherein at least some part of the actuating element (central portion of actuator 80) extends between the two spaced arms, for at least some positions of the actuating element with respect to the second part.

Regarding claim 8, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the engaging element (lower end 26 of pin 24, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1) comprises a second support surface (ledge surface 32, col. 3 ln. 7-29, Fig. 1) positioned to engage the first-named support surface (sliding surface 38) of the actuating element (collar 34, col. 3 ln. 30-33).

Regarding claim 9, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the actuating element (collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) is accessible from a periphery of the second part (lower portion 12) and crosses the central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52).

Regarding claim 10, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the actuating element (collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6; sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 6) and a central portion (medial portion of collar 34) said peripheral portion oriented at least in part at an oblique angle (Fig. 6) with respect to the central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10, col. 2 ln. 11 to col. 3 ln. 6, col. 3 ln. 30 to col. 4 ln. 24, Fig. 1) to offset said central portion away from the drive stud along the central longitudinal axis.

Regarding claim 11, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a first sloping arm (sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 2, 6) extending at an oblique angle away from the central portion.

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Regarding claim 12, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) comprising an actuating element (actuator 80) comprising two arms (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) extending from the actuating element, yet fails to disclose wherein the peripheral portion further comprises a second sloping arm extending at an oblique angle away from the central portion. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a first sloping arm (sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 2, 6) extending at an oblique angle away from the central portion. Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) comprising two arms (peripheral portions 84) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint wherein the peripheral portion further comprises a second sloping arm extending at an oblique angle away from the central portion, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

Regarding claim 13, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein first and second arms (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5 of actuator 80) are positioned on opposite sides of the central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5).

Regarding claim 14, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the actuating element (collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) is coupled to the engaging element (lower end 26 of pin 24, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1) at the peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6).

Regarding claim 15, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) comprising a biasing element (spring 70, col. 3 ln. 42-56, Fig. 3, 5) operative to bias the actuating element (actuator 80) toward a rest position (Fig. 3) while remaining free of engagement with the coupling element (coupling element 32).

Regarding claim 16, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising: a guide in the second part (stepped bore 61) an engaging element (linking element 60; socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing-position (Fig. 5) an actuating element (actuator 80) coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element comprising a peripheral portion (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) and a central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5), said peripheral portion positioned away from the drive stud with respect to a central longitudinal axis (axis 30) of the drive stud; said actuating element crossing the central longitudinal axis, yet fails to disclose wherein the peripheral portion oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising a coupling element (extension bar E, col. 2 ln. 44-56, Fig. 5, 6), an actuating element (collar 34, col. 3 ln. 30-33), a second part (lower portion 12) and a guide (diagonally positioned opening 16, col. 2 ln. 57-66) oriented at an oblique angle with respect to a central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10). Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts comprising: a guide in the second part; an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position; an actuating element coupled with the engaging element such that longitudinal movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element comprising a peripheral portion and a central portion, said peripheral portion positioned away from the drive stud and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud; said actuating element crossing the central longitudinal axis, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

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Regarding claim 17, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising: a guide (stepped bore 61) in the second part; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing-position (Fig. 5) an actuating element (actuator 80) coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element comprising peripheral portion (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) and a central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5), said peripheral portion positioned away from the drive stud; said second part comprising at least two load-bearing protrusions (parallel arms 26) configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element (Fig. 1, 5) extending between the load-bearing protrusions for at least some positions of the actuating element, yet fails to disclose wherein the peripheral portion positioned away from and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising a coupling element (extension bar E, col. 2 ln. 44-56, Fig. 5, 6), an actuating element (collar 34, col. 3 ln. 30-33), a second part (lower portion 12), wherein the actuating element (collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6; sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 6) and a central portion (medial portion of collar 34) said peripheral portion oriented at least in part at an oblique angle (Fig. 6) with respect to the central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10, col. 2 ln. 11 to col. 3 ln. 6, col. 3 ln. 30 to col. 4 ln. 24, Fig. 1) to offset said central portion away from the drive stud along the central longitudinal axis. Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts comprising: a guide in the second part; an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position; an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element comprising a peripheral portion and a central portion, said peripheral portion positioned away from the drive stud and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud; said second part comprising at least two load-bearing protrusions configured to participate in torque transmission between the coupling element and the second part, at least part of said actuating element extending between the load-bearing protrusions for at least some positions of the actuating element, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

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Regarding claim 18, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) said universal joint comprising a first part (first part 12, Fig. 3-5) a second part (second part 20) comprising a drive stud (drive stud 22) and at least one coupling element (coupling element 32) coupled between the first and second parts the at least one coupling element configured to transmit torque between the first and second parts, comprising a guide (stepped bore 61) in the second part; an engaging element (linking element 60, socket engaging element 50) movably mounted in the guide to extend out of the drive stud and engage a tool attachment (socket S, Fig. 2; tool head, not illustrated, col. 3 ln. 1-12) when in an engaging position (Fig. 3) and to release the tool attachment when in a releasing position (Fig. 5); an actuating element (actuator 80) coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element comprising a peripheral portion (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) and a central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5), said peripheral portion positioned away from the drive stud; said coupling element and said second part cooperating to form an aperture (second joint portion 24, col. 3 ln. 1-13, Fig. 1, 3-5), at least part of said actuating element extending into the aperture for at least some positions of the actuating element, yet fails to disclose wherein the peripheral portion is oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising a coupling element (extension bar E, col. 2 ln. 44-56, Fig. 5, 6), an actuating element (collar 34, col. 3 ln. 30-33), a second part (lower portion 12), wherein the actuating element (collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6; sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 6) and a central portion (medial portion of collar 34) said peripheral portion oriented at least in part at an oblique angle (Fig. 6) with respect to the central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10, col. 2 ln. 11 to col. 3 ln. 6, col. 3 ln. 30 to col. 4 ln. 24, Fig. 1) to offset said central portion away from the drive stud along the central longitudinal axis. Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint for use with a torque transmitting tool, said universal joint comprising a first part, a second part comprising a drive stud, and at least one coupling element coupled between the first and second parts, said at least one coupling element configured to transmit torque between the first and second parts, comprising:

a guide in the second part; an engaging element movably mounted in the guide to extend out of the drive stud and engage a tool attachment when in an engaging position and to release the tool attachment when in a releasing-position; an actuating element coupled with the engaging element such that movement of the actuating element with respect to the second part results in movement of the engaging element; said actuating element comprising a peripheral portion and a central portion, said peripheral portion positioned away from the drive stud and oriented at least in part at an oblique angle with respect to a central longitudinal axis of the drive stud; said coupling element and said second part cooperating to form an aperture, at least part of said actuating element extending into the aperture for at least some positions of the actuating element, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

Regarding claim 19, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the actuating element (collar 34, col. 3 ln. 30-33) comprises a collar extending around the second part (lower portion 12, col. 2 ln. 11-66, col. 3 ln. 64 to col. 4 ln. 15).

Regarding claim 20, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5) is offset away from the drive stud (drive stud 22) along the central longitudinal axis (axis 30) by the peripheral portion (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5).

Regarding claim 21, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the collar (collar 34, col. 3 ln. 30-33) is centered on a first plane (plane described by lower portion of collar 34, col. 3 ln. 30-33, Fig. 5, 6) oriented transversely to the longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10) when the actuating element is in a first position (engaging position, Fig. 4, 5) with respect to the second part (lower portion 12).

Regarding claim 22, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5) is centered on a second plane (plane described by upper surface of actuator 80, Fig. 3, 5) oriented transversely to the longitudinal axis (axis 30) when the actuating element is in the first position (engaging position, Fig. 3).

Regarding claim 23, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14), comprising a drive stud (drive stud 22) and an actuating element (actuator 80) having upper and lower surfaces defining a second plane, yet fails to disclose wherein the drive stud and the second plane are positioned on opposite sides of a first plane. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the collar (collar 34, col. 3 ln. 30-33) is centered on a first plane (plane described by lower portion of collar 34, col. 3 ln. 30-33, Fig. 5, 6) oriented transversely to the longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52) of the drive stud (drive stud 10). Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) and actuating element (actuator 80) of Roberts 548 with the actuating element (collar 34) of Roberts 892 to construct a universal joint wherein the drive stud and the second plane are positioned on opposite sides of the first plane.

Regarding claim 24, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a first sloping arm (sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 2, 6) extending at an oblique angle away from the central portion.

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Regarding claim 25, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) comprising an actuating element (actuator 80) comprising two arms (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) extending from the actuating element, yet fails to disclose wherein the peripheral portion further comprises a second sloping arm extending at an oblique angle between the collar and the central portion. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) comprises a first sloping arm (sliding surface 38, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1, 2, 6) extending at an oblique angle away from the central portion. Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) comprising two arms (peripheral portions 84) of Roberts 548 with the actuating element (collar 34) and guide (diagonally positioned opening 16) of Roberts 892 to construct a universal joint wherein the peripheral portion further comprises a second sloping arm extending at an oblique angle between the collar and the central portion, since such a combination would result in a device with increased ease of use and greater security for the capture of a tool attachment.

Regarding claim 26, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein first and second arms (peripheral portions 84, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5 of actuator 80) are positioned on opposite sides of the central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5).

Regarding claim 27, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the actuating element (actuator 80, col. 3 ln. 57 to col. 4 ln. 14, Fig. 3-5) is coupled to the engaging element at the central portion (portion of actuator 80 proximal stub shaft 69, col. 3 ln. 42-66, Fig. 3, 5).

Regarding claim 28, Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) wherein the actuating element (collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6) is coupled to the engaging element (lower end 26 of pin 24, col. 2 ln. 44 to col. 3 ln. 52, Fig. 1) at the peripheral portion (distal portion of collar 34, col. 3 ln. 30-33, Fig. 1, 2, 6).

Regarding claim 29, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) wherein the second part (second part 20) comprises two spaced arms (second arms 26, col. 3 ln. 1-24, 57-66, Fig. 1) positioned on respective sides of the coupling element (coupling element 32), and wherein at least some part of the actuating element (central portion of actuator 80) extends between the two spaced arms, for at least some positions of the actuating element with respect to the second part.

Regarding claim 30, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-14) for use with a torque transmitting tool (torque transmitting tool, not illustrated col. 2 ln. 55-68) comprising a biasing element (spring 70, col. 3 ln. 42-66, Fig. 3, 5) operative to bias the actuating element (actuator 80) toward a rest position (Fig. 3) while remaining free of engagement with the coupling element (coupling element 32).

Regarding claim 36, Roberts 548 discloses a universal joint (universal joint 10, col. 2 ln. 55 to col. 4 ln. 27, Fig. 1-5) wherein the internal passageway (stepped bore 61) is oriented substantially parallel to the central longitudinal axis (axis 30), yet fails to disclose wherein the internal passageways oriented at an oblique angle to the central longitudinal axis. Roberts 892 discloses a torque transmitting tool (col. 2 ln. 44 to col. 6 ln. 11, Fig. 1-6) comprising an internal passageway (diagonally positioned opening 16, col. 2 ln. 57-66) oriented at an oblique angle with respect to a central longitudinal axis (longitudinal axis 40, col. 3 ln. 34-52). Since both references are directed to torque transmitting tools, it would have been obvious to one of skill in the art to combine the universal joint (universal joint 10) of Roberts 548 with internal passageway (diagonally positioned opening 16) of Roberts 892 to construct a universal joint for use with a torque transmitting tool wherein the internal passageways oriented at an oblique angle to the central longitudinal axis, since such a combination would result in a universal joint having greater tool capturing force.

Claims 1-46 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

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From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

ZAYIA, Gregory H.
BRINKS HOFER GILSON & LIONE
P.O. Box 10087
Chicago, IL 60610
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 15 August 2007 (15.08.2007)	
Applicant's or agent's file reference 742-309	IMPORTANT NOTIFICATION
International application No. PCT/US2007/011344	International filing date (day/month/year) 10 May 2007 (10.05.2007)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 02 June 2006 (02.06.2006)
Applicant JODA ENTERPRISES, INC. et al	

- By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
- (If applicable)* The letters "NR" appearing in the right-hand column denote a priority document which, **on the date of mailing of this Form, had not yet been received by the International Bureau** under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
- (If applicable)* An asterisk (*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b) (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
02 June 2006 (02.06.2006)	60/810,239	US	23 July 2007 (23.07.2007)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Yoshiko Kuwahara
Facsimile No. +41 22 338 82 70	Facsimile No. +41 22 338 82 70 Telephone No. +41 22 338 74 07

PATENT COOPERATION TREATY

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From the RECEIVING OFFICE

PCT

To:
GREGORY H. ZAYIA
BRINKS HOFER GILSON & LIONE
P.O. BOX 10087
CHICAGO, ILLINOIS 60610

NOTIFICATION OF THE INTERNATIONAL
APPLICATION NUMBER AND OF THE
INTERNATIONAL FILING DATE

(PCT Rule 20.2(c))

Confirmation No: 2311

Date of mailing
(day/month/year) 20 Jul 2007

Applicant's or agent's file reference
742-309

IMPORTANT NOTIFICATION

International application No.
PCT/US2007/011344

International filing date (day/month/year)
10 May 2007

Priority date (day/month/year)
02 Jun 2006

Applicant
JODA ENTERPRISES INC.

Title of the invention
UNIVERSAL JOINT WITH COUPLING MECHANISM FOR DETACHABLY ENGAGING TOOL ATTACHMENTS

1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.

2. The applicant is further notified that the record copy of the international application:

- ☒ was transmitted to the International Bureau on 20 Jul 2007
- ☐ has not yet been transmitted to the International Bureau for the reason indicated below and a copy of this notification has been sent to the International Bureau*:
- ☐ because the necessary national security clearance has not yet been obtained.
- ☐ because (reason to be specified):

* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

3. FOREIGN TRANSMITTAL LICENSE INFORMATION

Completed by: DG

- ☐ Additional license for foreign transmittal not required. This subject matter is covered by a license already granted or the equivalent U.S. national application. Refer to that license for information concerning its scope.
- ☐ License for foreign transmittal not required. 37 CFR 5.11(e)(1) or 37 CFR 5.11(e)(2). However, a license may be required for additional subject matter. See 37 CFR 5.15(b).
- ☒ Foreign transmittal license granted. 35 U.S.C. 184; 37 CFR 5.11 on 16 Jul 2007 (date)
- ☒ 37 CFR 5.15(a) ☐ 37 CFR 5.15(b)

Name and mailing address of the receiving Office
Mail Stop PCT, Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450
Facsimile No. 571-273-3201

Authorized officer
Dian Gordon
Telephone No. 703-308-9290 EX 125

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference (if desired) (12 characters maximum) 742-309

Box No. I TITLE OF INVENTION	
UNIVERSAL JOINT WITH COUPLING MECHANISM FOR DETACHABLY ENGAGING TOOL ATTACHMENTS	
Box No. II APPLICANT ☐ This person is also inventor	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) JODA Enterprises, Inc. 2440 Lakeview Avenue Chicago, Illinois 60614 United States of America	Telephone No. Facsimile No. Applicant's registration No. with the Office
State (that is, country) of nationality: US	State (that is, country) of residence: US
This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.	
Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) ZAYIA, Gregory H. BRINKS HOFER GILSON & LIONE P.O. Box 10087 Chicago, Illinois 60610 United States of America	Telephone No. 312-321-4200 Facsimile No. 312-321-4299 Agent's registration No. with the Office 48,059
☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

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Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S) <i>If none of the following sub-boxes is used, this sheet should not be included in the request.</i>	
Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i> DAVIDSON, John B. 2440 Lakeview Avenue #3A Chicago, Illinois 60614 United States of America	This person is: ☐ applicant only ☒ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i> Applicant's registration No. with the Office
State <i>(that is, country)</i> of nationality: US	State <i>(that is, country)</i> of residence: US
This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i> MOON, C. Robert 1128 Loreta Avenue Joliet, Illinois 60435 United States of America	This person is: ☐ applicant only ☒ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i> Applicant's registration No. with the Office
State <i>(that is, country)</i> of nationality: US	State <i>(that is, country)</i> of residence: US
This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i> 	This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i> Applicant's registration No. with the Office
State <i>(that is, country)</i> of nationality: 	State <i>(that is, country)</i> of residence:
This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i> 	This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only <i>(If this check-box is marked, do not fill in below.)</i> Applicant's registration No. with the Office
State <i>(that is, country)</i> of nationality: 	State <i>(that is, country)</i> of residence:
This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box	
☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.	

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Box No. V DESIGNATIONS

The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents. However,

- ☐ DE Germany is not designated for any kind of national protection
☐ JP Japan is not designated for any kind of national protection
☐ KR Republic of Korea is not designated for any kind of national protection
☐ RU Russian Federation is not designated for any kind of national protection

(The check-boxes above may only be used to exclude (irrevocably) the designations concerned if, at the time of filing or subsequently under Rule 26bis.1, the international application contains in Box No. VI a priority claim to an earlier national application filed in the particular State concerned, in order to avoid the ceasing of the effect, under the national law, of this earlier national application.)

Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country or Member of WTO	regional application: regional Office	international application: receiving Office
item (1) 02 June 2006 (02.06.2006)	60/810,239	US		
item (2)				
item (3)				

☐ Further priority claims are indicated in the Supplemental Box.

Transmit certified copy: the receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office) identified above as:

☒ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ other, see Supplemental Box

Restore the right of priority: the receiving Office is requested to restore the right of priority for the earlier application(s) identified above or in the Supplemental Box as item(s) (). (See also the Notes to Box No. VI: further information must be provided to support a request to restore the right of priority.)

Incorporation by reference: where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA / US

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year) Number Country (or regional Office)

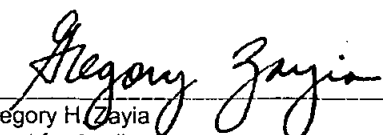
Box No. VIII DECLARATIONS

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

Number of declarations

- | | | |
|---|--|---|
| ☐ Box No. VIII (i) | Declaration as to the identity of the inventor | : |
| ☐ Box No. VIII (ii) | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent | : |
| ☐ Box No. VIII (iii) | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | : |
| ☐ Box No. VIII (iv) | Declaration of inventorship (only for the purposes of the designation of the United States of America) | : |
| ☐ Box No. VIII (v) | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty | : |

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Box No. IX CHECK LIST; LANGUAGE OF FILING		
This international application contains: (a) on paper, the following number of sheets: request (including declaration and supplemental sheets) : 4 description (excluding sequence listing and/or tables related thereto) : 13 claims : 14 abstract : 1 drawings : 4 Sub-total number of sheets : 36 sequence listing : tables related thereto : <i>(for both, actual number of sheets if filed on paper, whether or not also filed in electronic form; see (c) below)</i> Total number of sheets : 36 (b) ☐ only in electronic form (Section 801(a)(i)) (i) ☐ sequence listing (ii) ☐ tables related thereto (c) ☐ also in electronic form (Section 801(a)(ii)) (i) ☐ sequence listing (ii) ☐ tables related thereto Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the ☐ sequence listing: ☐ tables related thereto: <i>(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)</i>	This international application is accompanied by the following item(s) <i>(mark the applicable check-boxes below and indicate in right column the number of each item)</i>: 1. ☒ fee calculation sheet : 1 2. ☐ original separate power of attorney : 3. ☐ original general power of attorney : 4. ☒ copy of general power of attorney; reference number, if any: : 1 5. ☐ statement explaining lack of signature : 6. ☐ priority document(s) identified in Box No. VI as item(s): : 7. ☐ translation of international application into <i>(language)</i>: : 8. ☐ separate indications concerning deposited microorganism or other biological material : 9. ☐ sequence listing in electronic form <i>(indicate type and number of carriers)</i> (i) ☐ copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application) : (ii) ☐ <i>(only where check-box (b)(i) or (c)(i) is marked in left column)</i> additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter : (iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column : 10. ☐ tables in electronic form related to sequence listing <i>(indicate type and number of carriers)</i> (i) ☐ copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application) : (ii) ☐ <i>(only where check-box (b)(ii) or (c)(ii) is marked in left column)</i> additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater) : (iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column : 11. ☒ other <i>(specify)</i>: Certificate of Service, postcard : 2	Number of items
Figure of the drawings which should accompany the abstract:	Language of filing of the international application: English	
Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE <i>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</i>		
 Gregory H. Zayia Agent for Applicants		

For receiving Office use only	
1. Date of actual receipt of the purported international application:	2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA /	6. ☐ Transmittal of search copy delayed until search fee is paid

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

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The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ US

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty.

For International Preliminary Examining Authority use only		
Identification of IPEA	Date of receipt of DEMAND	
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 742-309
International application No. PCT/US2007/011344	International filing date (day/month/year) 10 May 2007 (10.05.2007)	(Earliest) Priority date (day/month/year) 02 June 2006 (02.06.2006)
Title of invention UNIVERSAL JOINT WITH COUPLING MECHANISM FOR DETACHABLY ENGAGING TOOL ATTACHMENTS		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country) JODA Enterprises, Inc. 2440 Lakeview Avenue Chicago, Illinois 60614 United States of America		Telephone No.
		Facsimile No.
		Applicant's registration No. with the Office
State (that is, country) of nationality: US	State (that is, country) of residence: US	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country) DAVIDSON, John B. 2440 Lakeview Avenue #3A Chicago, Illinois 60614 United States of America		
State (that is, country) of nationality: US	State (that is, country) of residence: US	
☒ Further applicants are indicated on a continuation sheet.		

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

MOON, C. Robert
1128 Loreta Avenue
Joliet, Illinois 60435
United States of America

State (that is, country) of nationality:
US

State (that is, country) of residence:
US

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

☐

Further applicants are indicated on another continuation sheet.

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*ZAYIA, Gregory H.
BRINKS HOFER GILSON & LIONE
P.O. Box 10087
Chicago, Illinois 60610
United States of America

Telephone No.

312-321-4200

Facsimile No.

312-321-4299

Agent's registration No. with the Office

48,059

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☒ as originally filed
☐ as amended under Article 34the claims ☒ as originally filed
☐ as amended under Article 19 (together with any accompanying statement)
☐ as amended under Article 34the drawings ☒ as originally filed
☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ Where the IPEA wishes to start the international preliminary examination at the same time as the international search in accordance with Rule 69.1(b), the applicant requests the IPEA to postpone the start of the international preliminary examination until the expiration of the applicable time limit under Rule 69.1(d).4. ☐ The applicant expressly wishes the international preliminary examination to start earlier than at the expiration of the applicable time limit under Rule 54bis.1(a).

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: ... English

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**

The filing of this demand constitutes the election of all Contracting States which are designated and are bound by Chapter II of the PCT.

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (<i>specify</i>) | : | sheets |

For International Preliminary Examining Authority use only

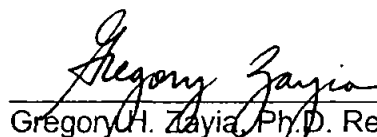
- | received | not received |
|--------------------------|--------------------------|
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. ☒ fee calculation sheet | 5. ☐ statement explaining lack of signature |
| 2. ☐ original separate power of attorney | 6. ☐ sequence listing in electronic form |
| 3. ☐ original general power of attorney | 7. ☐ tables in electronic form related to a sequence listing |
| 4. ☐ copy of general power of attorney; reference number, if any: | 8. ☒ other (<i>specify</i>): Certificate of Service, acknowledgment card. |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).


 Gregory H. Zayia Ph.D. Reg. # 48,059
 Agent for Applicants

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.
☐ The applicant has been informed accordingly.
4. ☐ The date of receipt of the demand is WITHIN the time limit of 19 months from the priority date as extended by virtue of Rule 80.5.
5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

6. ☐ The date of receipt of the demand is AFTER the expiration of the time limit under Rule 54bis.1(a) and item 7 or 8, below, does not apply.
7. ☐ The date of receipt of the demand is WITHIN the time limit under Rule 54bis.1(a) as extended by virtue of Rule 80.5.
8. ☐ Although the date of receipt of the demand is after the expiration of the time limit under Rule 54bis.1(a), the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

**RECORDATION FORM COVER SHEET
PATENTS ONLY**

To the Director of the U.S. Patent and Trademark Office: Please record the attached documents or the new address(es) below:

1. Name of conveying Party(ies)/Execution Date:C. ROBERT MOON/JULY 5, 2006
JOHN B. DAVIDSON/JUNE 23, 2006

Additional name(s) of conveying party(ies) attached?

☐ Yes ☒ No**2. Name and Address of receiving Party(ies):**

Name: JODA ENTERPRISES, INC.

Internal Address:

Street Address: 2440 Lakeview Avenue

City: Chicago

State: Illinois

Country: U.S.A. Zip: 60614

Additional name(s) and addresses attached? ☐ Yes ☒ No**3. Nature of Conveyance:**

Execution Date(s): June 23, 2006; July 5, 2006

- | | | |
|---|---|---|
| ☒ Assignment | ☐ Change of Name | ☐ Executive Order 9424, Confirmatory License |
| ☐ Security Agreement | ☐ Merger | ☐ Joint Research Agreement |
| ☐ Government Interest Assignment | ☐ Other | |

4. Application or patent number(s).☐ This document is being filed together with a new application.A. Patent Application No.(s)
60/810,239

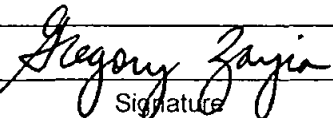
B. Patent No.(s)

Additional numbers attached? ☐ Yes ☒ No**5. Name and address of party to whom correspondence concerning document should be mailed:**BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610
(312) 321-4200
(312) 321-4299 Fax**6. Total number of applications and patents involved: 1****7. Total fee (37 CFR 1.21(h) & 3.41) \$ 40.00**

- ☐ Authorized to be charged by credit card.
☒ Authorized to be charged to Deposit Account No. 23-1925.
☐ Enclosed
☐ None required (government interest not affecting title)

8. Payment Information:

- a. ☐ Credit Card: Last 4 Numbers
Expiration Date
- b. ☒ Charge fee and/or any Deficiencies to Deposit
Account Number: 23-1925
Authorized User Name: Brinks Hofer Gilson & Lione

9. Signature:

Gregory H. Zavla - Reg. No. 48,059

Name of Person Signing

August 8, 2006

Date

Total number of pages including cover
sheet, attachments, and documents: 7

Documents to be recorded (including cover sheet) should be faxed to (571) 273-0140, or mailed to:
Mail Stop Assignment Recordation Services, Director of the USPTO, P.O. Box 1450, Alexandria, VA 22313-1450

ASSIGNMENT

WHEREAS, C. Robert Moon and John B. Davidson, hereinafter called the "Assignors", have made the invention described in the United States patent application entitled Universal Joint with Coupling Mechanism for Detachably Engaging Tool Attachments, for a full description of which reference is here made to an application for Letters Patent of the United States filed on June 2, 2006, and assigned Application Serial No. 60/810,239;

WHEREAS, JODA Enterprises, Inc., a corporation organized and existing under the laws of the State of Illinois, having a place of business at 2440 Lakeview Avenue, Chicago, Illinois 60614, U.S.A., hereinafter called the "Assignee", desires to acquire the entire right, title and interest in and to the invention and the patent application identified above, and all patents which may be obtained for said invention, as set forth below;

NOW, THEREFORE, in consideration of the sum of One Dollar (\$1.00), and other valuable and legally sufficient consideration, the receipt of which by the Assignors from the Assignee is hereby acknowledged, the Assignors have sold, assigned and transferred, and by these presents do sell, assign and transfer to the Assignee, the entire right, title and interest for the United States in and to the invention and the patent application identified above, and any patents that may issue for said invention in the United States; together with the entire right, title and interest in and to said invention and all patent applications and patents therefor in all countries foreign to the United States, including the full right to claim for any such application all benefits and priority rights under any applicable convention; together with the entire right, title and interest in and to all continuations, divisions, renewals and extensions of any of the patent applications and patents defined above; together with the right to recover all damages, including, but not limited to, a reasonable royalty, by reason of past, present, or future infringement or any other violation of patent or patent application rights; to have and to hold for the sole and exclusive use and benefit of the Assignee, its successors and assigns, to the full end of the term or terms for all such patents.

The Assignors hereby covenant and agree, for both the Assignors and the Assignors' legal representatives, that the Assignors will assist the Assignee in the prosecution of the patent application identified above; in the making and prosecution of any other patent

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applications that the Assignee may elect to make covering the invention identified above; in vesting in the Assignee like exclusive title in and to all such other patent applications and patents; and in the prosecution of any interference which may arise involving said invention, or any such patent application or patent; and that the Assignors will execute and deliver to the Assignee any and all additional papers which may be requested by the Assignee to carry out the terms of this Assignment.

The Commissioner of Patents and Trademarks is hereby authorized and requested to issue patents to the Assignee in accordance with the terms of this Assignment.

IN TESTIMONY WHEREOF, the Assignors have executed this agreement.

DATED:

July 5, 2006

C. Robert Moon
C. Robert Moon

DATED:

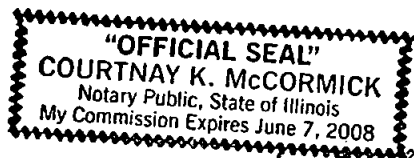
John B. Davidson

107

STATE OF Ill.)
) ss.
COUNTY OF Will)

I, Courtney K. McCormick, a Notary Public in and for the County and State aforesaid, do hereby certify that C. Robert Moon, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that (s)he signed, sealed and delivered the said instrument as his/her free and voluntary act for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial Seal, this day of July 5, 2006.



[Signature]
Notary Public

My Commission Expires: June 7 2008

STATE OF)
) ss.
COUNTY OF)

I, _____, a Notary Public in and for the County and State aforesaid, do hereby certify that John B. Davidson, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that (s)he signed, sealed and delivered the said instrument as his/her free and voluntary act for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial Seal, this day of _____, 2006.

Notary Public

My Commission Expires:

ASSIGNMENT

WHEREAS, C. Robert Moon and John B. Davidson, hereinafter called the "Assignors", have made the invention described in the United States patent application entitled Universal Joint with Coupling Mechanism for Detachably Engaging Tool Attachments, for a full description of which reference is here made to an application for Letters Patent of the United States filed on June 2, 2006, and assigned Application Serial No. 60/810,239;

WHEREAS, JODA Enterprises, Inc., a corporation organized and existing under the laws of the State of Illinois, having a place of business at 2440 Lakeview Avenue, Chicago, Illinois 60614, U.S.A., hereinafter called the "Assignee", desires to acquire the entire right, title and interest in and to the invention and the patent application identified above, and all patents which may be obtained for said invention, as set forth below;

NOW, THEREFORE, in consideration of the sum of One Dollar (\$1.00), and other valuable and legally sufficient consideration, the receipt of which by the Assignors from the Assignee is hereby acknowledged, the Assignors have sold, assigned and transferred, and by these presents do sell, assign and transfer to the Assignee, the entire right, title and interest for the United States in and to the invention and the patent application identified above, and any patents that may issue for said invention in the United States; together with the entire right, title and interest in and to said invention and all patent applications and patents therefor in all countries foreign to the United States, including the full right to claim for any such application all benefits and priority rights under any applicable convention; together with the entire right, title and interest in and to all continuations, divisions, renewals and extensions of any of the patent applications and patents defined above; together with the right to recover all damages, including, but not limited to, a reasonable royalty, by reason of past, present, or future infringement or any other violation of patent or patent application rights; to have and to hold for the sole and exclusive use and benefit of the Assignee, its successors and assigns, to the full end of the term or terms for all such patents.

The Assignors hereby covenant and agree, for both the Assignors and the Assignors' legal representatives, that the Assignors will assist the Assignee in the prosecution of the patent application identified above; in the making and prosecution of any other patent

109

applications that the Assignee may elect to make covering the invention identified above; in vesting in the Assignee like exclusive title in and to all such other patent applications and patents; and in the prosecution of any interference which may arise involving said invention, or any such patent application or patent; and that the Assignors will execute and deliver to the Assignee any and all additional papers which may be requested by the Assignee to carry out the terms of this Assignment.

The Commissioner of Patents and Trademarks is hereby authorized and requested to issue patents to the Assignee in accordance with the terms of this Assignment.

IN TESTIMONY WHEREOF, the Assignors have executed this agreement.

DATED: _____

C. Robert Moon

DATED: _____

June 23, 2006

John B. Davidson
John B. Davidson

110

STATE OF)
) ss.
COUNTY OF)

I, _____, a Notary Public in and for the County and State aforesaid, do hereby certify that C. Robert Moon, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that (s)he signed, sealed and delivered the said instrument as his/her free and voluntary act for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial Seal, this day of _____, 2006.

Notary Public

My Commission Expires:

STATE OF Illinois)
) ss.
COUNTY OF Cook)

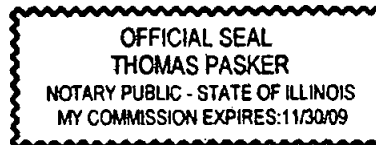
I, Thomas Pasker, a Notary Public in and for the County and State aforesaid, do hereby certify that John B. Davidson, personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that (s)he signed, sealed and delivered the said instrument as his/her free and voluntary act for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and Notarial Seal, this 23 day of June, 2006.

[Signature]

Notary Public

My Commission Expires: 11-30-2009





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 www.uspto.gov

APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
60/810,239	06/02/2006		100	742/298	4		

CONFIRMATION NO. 7294

00757

BRINKS HOFER GILSON & LIONE
 P.O. BOX 10395
 CHICAGO, IL 60610

FILING RECEIPT



OC000000019322824

Date Mailed: 06/19/2006

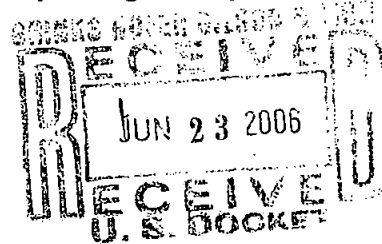
Receipt is acknowledged of this provisional Patent Application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

John B. Davidson, Chicago, IL;
 C. Robert Moon, Joliet, IL;

Power of Attorney:

Gregory Zayia-48059



If Required, Foreign Filing License Granted: 06/16/2006

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US60/810,239**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: Not applicable

Early-Publication Request: Not applicable

**** SMALL ENTITY ****

Title

Universal joint with coupling mechanism for detachably engaging tool attachments

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR UTILITY OR DESIGN PATENT APPLICATION
(37 C.F.R. §1.63)**

As a below named inventor, I hereby declare:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor or an original, first and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled:

**UNIVERSAL JOINT WITH COUPLING MECHANISM
FOR DETACHABLY ENGAGING TOOL ATTACHMENTS**

the specification of which (check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge my duty to disclose to the United States Patent and Trademark Office all information that I know to be material to the patentability of this application as defined in 37 C.F.R. §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or (f), or §365(b) of any foreign application(s) for patent or inventor's or plant breeder's rights certificate(s), or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's or plant breeder's rights certificate(s) or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

Priority
Not Claimed

_____ (Number)	_____ (Country)	_____ (Filing Date, MM/DD/YYYY)	☐
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_____ (Number)	_____ (Country)	_____ (Filing Date, MM/DD/YYYY)	☐
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I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

<u>60/810,239</u> (Application Serial No.)	<u>06/02/2006</u> (Filing Date, MM/DD/YYYY)	<u>Pending</u> (Status: pending, or abandoned)
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_____ (Application Serial No.)	_____ (Filing Date, MM/DD/YYYY)	_____ (Status: pending, or abandoned)
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_____ (Application Serial No.)	_____ (Filing Date, MM/DD/YYYY)	_____ (Status: pending, or abandoned)
-----------------------------------	------------------------------------	--

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I HEREBY APPOINT the following Practitioners associated with the following Customer Number as my attorneys, with full power of substitution and revocation, to prosecute this application and any continuations, divisions, reissues, and reexaminations thereof, to receive the patent(s), to transact all business in the United States Patent and Trademark Office connected therewith, and to act on my behalf before the competent International Authorities in connection with any and all international applications filed by me:

Customer No. 00757 - Brinks Hofer Gilson Lione

PLEASE RECOGNIZE or change the CORRESPONDENCE ADDRESS for this application to the address associated with the above Customer Number:

PLEASE DIRECT all telephonic and facsimile communications to:

Gregory H. Zayia, Reg. No. 48,059
Tel: (312) 321-4200; Fax: (312) 321-4299

Full name of sole or first inventor C. Robert Moon	
Sole or first inventor's signature <i>C. Robert Moon</i>	Date <i>2006-Aug-18</i>
Residence (City, State/Foreign Country) 1128 Loreta Avenue, Joliet, Illinois 60435	
Citizenship U.S.A.	
Mailing Address 1128 Loreta Avenue, Joliet, Illinois 60435	

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I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)

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Gregory H. Zayia, Reg. No. 48,059
Tel: (312) 321-4200; Fax: (312) 321-4299

Full name of sole or first inventor C. Robert Moon	
Sole or first inventor's signature <i>C. Robert Moon</i>	Date <i>2006-Aug-18</i>
Residence (City, State/Foreign Country) 1128 Loretta Avenue, Joliet, Illinois 60435	
Citizenship U.S.A.	
Mailing Address 1128 Loretta Avenue, Joliet, Illinois 60435	

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Full name of second inventor, if any John B. Davidson	
Second inventor's signature	Date
Residence (City, State/Foreign Country) 2440 Lakeview Avenue #3A, Chicago, Illinois 60614	
Citizenship U.S.A.	
Mailing Address 2440 Lakeview Avenue #3A, Chicago, Illinois 60614	

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR UTILITY OR DESIGN PATENT APPLICATION
(37 C.F.R. §1.63)**

As a below named inventor, I hereby declare:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor or an original, first and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled:

**UNIVERSAL JOINT WITH COUPLING MECHANISM
FOR DETACHABLY ENGAGING TOOL ATTACHMENTS**

the specification of which (check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge my duty to disclose to the United States Patent and Trademark Office all information that I know to be material to the patentability of this application as defined in 37 C.F.R. §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or (f), or §365(b) of any foreign application(s) for patent or inventor's or plant breeder's rights certificate(s), or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's or plant breeder's rights certificate(s) or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):			Priority <u>Not Claimed</u>
_____ (Number)	_____ (Country)	_____ (Filing Date, MM/DD/YYYY)	☐
_____ (Number)	_____ (Country)	_____ (Filing Date, MM/DD/YYYY)	☐

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

<u>60/810,239</u> (Application Serial No.)	<u>06/02/2006</u> (Filing Date, MM/DD/YYYY)	<u>Pending</u> (Status: pending, or abandoned)
_____ (Application Serial No.)	_____ (Filing Date, MM/DD/YYYY)	_____ (Status: pending, or abandoned)
_____ (Application Serial No.)	_____ (Filing Date, MM/DD/YYYY)	_____ (Status: pending, or abandoned)

119

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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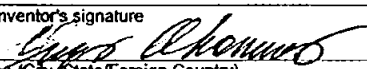
Gregory H. Zayia, Reg. No. 48,059
Tel: (312) 321-4200; Fax: (312) 321-4299

Full name of sole or first inventor John B. Davidson	
Sole or first inventor's signature	Date
Residence (City, State/Foreign Country) 2440 Lakeview Avenue #3A, Chicago, Illinois 60614	
Citizenship U.S.A.	
Mailing Address 2440 Lakeview Avenue #3A, Chicago, Illinois 60614	

120

Attorney Docket No. 742/303

Full name of third inventor, if any C. Robert Moon	
Third inventor's signature	Date
Residence (City, State/Foreign Country) 1128 Loreta Avenue, Joliet, Illinois 60435	
Citizenship U.S.A.	
Mailing Address 1128 Loreta Avenue, Joliet, Illinois 60435	

Full name of second inventor, if any George F. Charvat	
Second inventor's signature 	Date 8-18-06
Residence (City, State/Foreign Country) 309 Manor Hill Court, Lombard, Illinois 60148	
Citizenship U.S.A.	
Mailing Address 309 Manor Hill Court, Lombard, Illinois 60148	

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**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR UTILITY OR DESIGN PATENT APPLICATION
(37 C.F.R. §1.63)**

As a below named inventor, I hereby declare:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor or an original, first and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled:

**UNIVERSAL JOINT WITH COUPLING MECHANISM
FOR DETACHABLY ENGAGING TOOL ATTACHMENTS**

the specification of which (check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge my duty to disclose to the United States Patent and Trademark Office all information that I know to be material to the patentability of this application as defined in 37 C.F.R. §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or (f), or §365(b) of any foreign application(s) for patent or inventor's or plant breeder's rights certificate(s), or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's or plant breeder's rights certificate(s) or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

			Priority Not Claimed
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_____ (Number)	_____ (Country)	_____ (Filing Date, MM/DD/YYYY)	☐
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_____ (Number)	_____ (Country)	_____ (Filing Date, MM/DD/YYYY)	☐
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I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

<u>60/810,239</u> (Application Serial No.)	<u>06/02/2006</u> (Filing Date, MM/DD/YYYY)	<u>Pending</u> (Status: pending, or abandoned)
---	--	---

_____ (Application Serial No.)	_____ (Filing Date, MM/DD/YYYY)	_____ (Status: pending, or abandoned)
-----------------------------------	------------------------------------	--

_____ (Application Serial No.)	_____ (Filing Date, MM/DD/YYYY)	_____ (Status: pending, or abandoned)
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I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date, MM/DD/YYYY)	(Status: patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I HEREBY APPOINT the following Practitioners associated with the following Customer Number as my attorneys, with full power of substitution and revocation, to prosecute this application and any continuations, divisions, reissues, and reexaminations thereof, to receive the patent(s), to transact all business in the United States Patent and Trademark Office connected therewith, and to act on my behalf before the competent International Authorities in connection with any and all international applications filed by me:

Customer No. 00757 - Brinks Hofer Gilson Lione

PLEASE RECOGNIZE or change the CORRESPONDENCE ADDRESS for this application to the address associated with the above Customer Number:

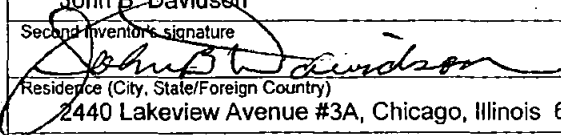
PLEASE DIRECT all telephonic and facsimile communications to:

Gregory H. Zayia, Reg. No. 48,059
Tel: (312) 321-4200; Fax: (312) 321-4299

Full name of sole or first inventor C. Robert Moon	
Sole or first inventor's signature	Date
Residence (City, State/Foreign Country) 1128 Loreta Avenue, Joliet, Illinois 60435	
Citizenship U.S.A.	
Mailing Address 1128 Loreta Avenue, Joliet, Illinois 60435	

127

Attorney Docket No. 742/304

Full name of second inventor, if any John B. Davidson	
Second inventor's signature 	Date 8/17/06
Residence (City, State/Foreign Country) 2440 Lakeview Avenue #3A, Chicago, Illinois 60614	
Citizenship U.S.A.	
Mailing Address 2440 Lakeview Avenue #3A, Chicago, Illinois 60614	

AS: 102004
124

PODER

POWER OF ATTORNEY

Yo (nosotros) JODA ENTERPRISES, INC.

I (We) JODA ENTERPRISES, INC.

domiciliado(s) en 2440 Lakeview Avenue, Chicago, IL 60614, Estados Unidos de América

domiciled in 2440 Lakeview Avenue, Chicago, IL 60614, United States of America

Nombro(amos) a: JUAN PABLO CADENA SARMIENTO y/o CARLOS H. PALACIO EASTMAN y/o MARTIN E. TORRES CARDOZO, de Bogotá, Colombia, apoderados verdaderos y legales con poder especial, amplio y suficiente, para recabar de las oficinas y autoridades colombianas administrativas, judiciales y de policía, en cualquier instancia o recurso, la obtención de patentes de invención, registros de marcas, diseños industriales, modelos de utilidad, depósitos de nombres comerciales, lemas comerciales y enseñas, registros de derechos de autor y contratos sobre los mismos, obtención de certificados de obtentor de variedades vegetales, así como sus prórogas, renovaciones, anotaciones de traspaso, cambios de nombre y/o domicilio y/o dirección; elaborar, tramitar y registrar contratos de licencia y licencias de cualesquiera clases; intervenir como demandante o como demandado en cualquier instancia y recurso ante cualquier juez, corporación, funcionario público o autoridad en acciones judiciales, administrativas y de policía tales como: oposiciones al registro de marcas; acciones de caducidad, cancelación y nulidad; acciones reivindicatorias, acciones derivadas de la obtención o explotación de licencias; acciones de competencia desleal; demandas penales; acciones de indemnización de perjuicios, reclamos y observaciones a solicitudes de patentes, diseños industriales, modelos de utilidad, en el ejercicio de medidas cautelares y en otras acciones o medidas similares.

Hereby appoints JUAN PABLO CADENA SARMIENTO and/or CARLOS H. PALACIO EASTMAN and/or MARTIN E. TORRES CARDOZO, of Bogotá, Colombia, my (our) true and lawful attorneys with special, ample and sufficient power to obtain from the Colombian administrative, judicial and police offices and authorities, in any instance, privileges of patents of invention, registration of trademarks, industrial designs and utility models; registration of commercial names, slogans and emblems, registration of copyright and contracts related thereto, certificates of obtainers of vegetables varieties, as well as extensions, renewals and recordal of assignments and changes of name, domicile and address related to the above; to prepare, prosecute and register licenses of any kind; to act as plaintiff or defendant in any instance or recourse, and before any judge, corporation, public official or authority in judicial, administrative and police actions, such as: oppositions to the registration of trademarks; caducity, cancellation and nullity actions; claim actions derived from the obtaining or exploitation of licenses, action of unfair competition; criminal proceedings, actions for payment of damages; claims or observations on patent applications, models, industrial designs and utility models; in the exercise of preventive measures and in other actions or similar proceedings.

A este efecto, lo(s) faculto(amos) para elevar solicitudes, formular descripciones, enmiendas, protestas, declaraciones, oposiciones, cancelaciones, nulidades, apelaciones y reclamos; pagar impuestos, cuotas y gravámenes prescritos por la ley; renunciar o desistir a derechos concedidos o en curso de concesión; recibir toda clase de documentos y valores, dando el descargo respectivo, y, en general, para dar ante dichas autoridades todos los pasos necesarios al efecto indicado y tomar todas las medidas que creyeran conducentes al resguardo de mis (nuestros) intereses, con todas las demás facultades legales necesarias.

To that effect they hereby empowered to file applications, formulate descriptions, amendments, protests, declarations, oppositions, cancellations, nullities, appeals and claims; to pay taxes, quotas and assessments prescribed by law, renounce or waive the rights granted or in the process of granting; to receive all kinds of documents and valuables, giving the respective release of receipt, and, in general, to take before said authorities the necessary steps to such effect, and any measures that they may deem pertinent to the safeguard of my (our) interest(s) with all the other necessary legal powers.

Este poder comprende la facultad de ratificar o confirmar en mi (nuestro) nombre lo actuado así como la facultad de desistir, transigir, comprometer, y la de sustituirlo en todo o en parte y revocar sustituciones. Asimismo nombro(amos) a: JUAN PABLO CADENA SARMIENTO y/o CARLOS H. PALACIO EASTMAN y/o MARTIN E. TORRES CARDOZO, domiciliado(s) en la Carrera 7 No. 71-21, Torre B, Piso 4, mis (nuestros) apoderados en Colombia, con facultades para recibir notificaciones y designar apoderados judiciales o extrajudiciales.

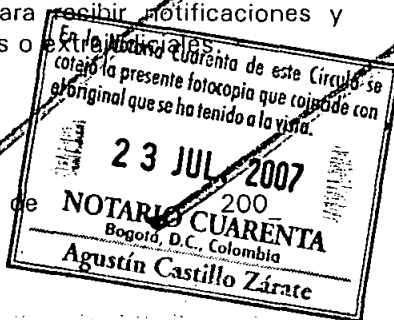
This power includes the faculty to ratify or confirm desist, settle and compromise on my (our) behalf, and to substitute this power in whole or in part and to revoke substitutions. At the same time I (We) hereby appoint JUAN PABLO CADENA SARMIENTO and/or CARLOS H. PALACIO EASTMAN and/or MARTIN E. TORRES CARDOZO, domiciled in Carrera 7 No. 71-21, Torre B, Piso 4, my (our) attorney(s) in fact, with powers to receive notifications and to designate judicial and extrajudicial attorneys.

Otorgado y firmado en

hoy de

Firma

Nombre
Cargo



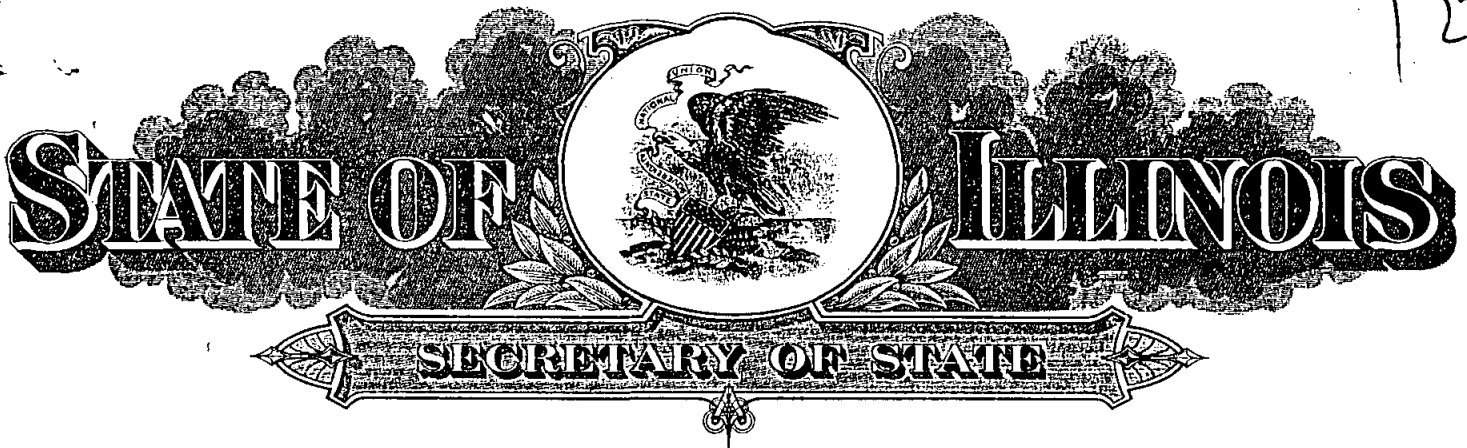
Granted and signed in Chicago, IL

this 22nd day of April - 2007

Signature John B. Davidson

Name JOHN B. DAVIDSON

Title CED



SPRINGFIELD, ILLINOIS
APOSTILLE
APOSTILLE

(Convention de La Haye du 5 Octobre 1961)

1. Country: United States of America
This public document
2. has been signed by JENNIFER L. DONOVAN
3. acting in the capacity of NOTARY PUBLIC, COOK COUNTY
4. bears the seal/stamp of STATE OF ILLINOIS

Certified

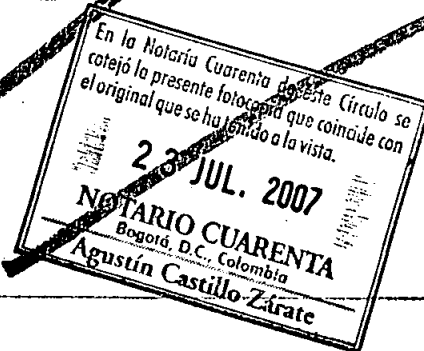
5. Chicago, Illinois
6. MAY 10, 2007
7. by the Secretary of State, State of Illinois
8. No. C07TJ18918
9. Seal/Stamp:

10. Signature:

Jesse White



JESSE WHITE
SECRETARY OF STATE
STATE OF ILLINOIS



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CERTIFICADO NOTARIAL (SOCIEDAD)

NOTARIAL CERTIFICATE (CORPORATION)

Hoy de
personalmente compareció ante mí

On this 22nd day of April of 07
personally appeared before me

a quien conozco, y de quien me consta que firmó el anterior documento, debidamente juramentado declaró y dijo que él (ella) es

to me known, and known to me to be the person who signed the foregoing instrument who being by me duly sworn did depose and say that he (she) is the

CEO

de JODA ENTERPRISES, INC.

of JODA ENTERPRISES, INC.

Sociedad legalmente constituida para un período de duración que aún no ha terminado; que el declarante está autorizado por dicha compañía para conferir este poder; que el sello estampado por él al pie de tal poder, en nombre y representación de la expresada compañía, es el sello oficial de ella; y que el objeto para el cual se confiere este instrumento está comprendido dentro del objeto social de la sociedad.

Which is legally constituted for a term not yet expired, that deponent is authorized by said Company to confer this Power of Attorney: that the seal affixed hereunto by the deponent in the name and on behalf of said Corporation is the corporate seal thereof; and that the purpose for which this instrument is granted is included within the corporate purpose of company.

El suscrito Notario hace constar que tuvo a la vista las pruebas de la existencia de la sociedad.

The undersigned Notary Public attests that he has seen the documents that prove the existence of the company.

Estado de
con fecha

State of Illinois
under date of April 22, 2007

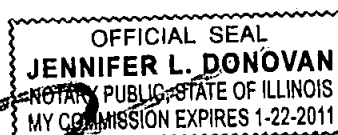
y que quien confiere el presente poder es su representante.

and that he (she) who grants the present power of attorney is its Representative.

Notario Público (sello)

Jennifer L. Donovan

Public Notary (Seal)



LEGALIZACION POR APOSTILLA ES REQUERIDA.

LEGALIZATION BY APOSTILLE IS REQUIRED.



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TRADUCCION AL ESPAÑOL del Documento de Poder otorgado por **JODA ENTERPRISES INC.** con domicilio en 2440 Lakeview Avenue, Chicago, IL 60614, Estados Unidos de América.

ESTADO DE ILLINOIS
SECRETARÍA DE ESTADO

SPRINGFIELD, ILLINOIS

APOSTILLA

(Convención de la Haya del 5 de Octubre de 1961)

1. País: Estados Unidos de América
Este documento público
2. ha sido firmado por **JENNIFER L. DONOVAN**
3. actuando en capacidad de NOTARIO PÚBLICO, CONDADO DE COOK
4. lleva el sello/timbre de **ESTADO DE ILLINOIS**

Certificado

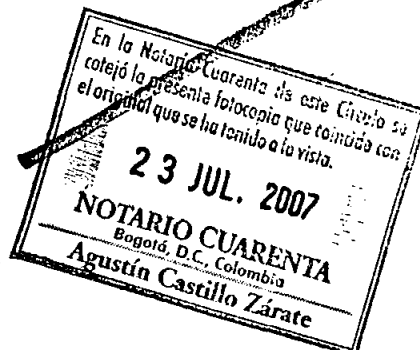
5. Chicago, Illinois
6. Mayo 10, 2007
7. por el Secretario de Estado, Estado de Illinois
8. No. C07TJ18918
9. Sello/Timbre:
10. Firma:

[Sello del Estado de Illinois]

(firma)
JESSE WHITE
SECRETARIO DE ESTADO
ESTADO DE ILLINOIS

Hay un sello que dice:

SELLO OFICIAL
JENNIFER L. DONOVAN
NOTARIO PÚBLICO, ESTADO DE ILLINOIS
MI COMISIÓN VENCE 1-22-2011



SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 08-127737- -00000-0000

Fecha: 2008-12-01 16:25:08 Dep. 2020 NUECREACION
Tra. 11 PATENTEIYII Eje: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 127



REQUISITOS MINIMOS PARA ADMISION A TRAMITE
PCT

PATENTE DE INVENCION



MODELO DE UTILIDAD []

- ◆ Indicación de que se solicita la concesión de una patente [x]
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud [x]
- ◆ Descripción de la invención [x]
- ◆ Dibujos de ser estos pertinentes [x]
- ◆ Comprobante de pago de las tasas establecidas [x]

COMPLETA []

INCOMPLETA []

DISEÑO INDUSTRIAL []

- ◆ Indicación de que se solicita el registro de Diseño Industrial []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

ESQUEMA DE TRAZADO []

- ◆ Indicación de que se solicita el registro de un Esquema de Trazado []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica del esquema trazado []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

Claudia Marlen Neiva Cortes
Firma Responsable

Fecha _____

Carrera 13 No. 27-00 Piso 6, 7 y 10
Corintujador: 3 82 08 40
Fax: 350 62 20
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia

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REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
CADENA SARMIENTO JUAN PABLO
Apoderado(a) y/o Representante de
JODA ENTERPRISES, INC

REFERENCIA	Radicación No.	8 127737
	Solicitud internacional	PCT/US2007/011344
	Fecha inicio fase nacional	02/01/2009
	Trámite	11
	Evento	379
	Actuación	430
	Oficio No.	

0502

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante, conforme a lo establecido por el artículo 26 literal k) de la Decisión 486 de la Comisión de la Comunidad Andina. Cuando se trate de documentos otorgados en el extranjero, estos deberán legalizarse de conformidad con lo dispuesto por los artículos 259 y 260 del Código de Procedimiento Civil. Cuando se trate de las declaraciones a que hace referencia la Regla 4.17 ii) del Tratado de Cooperación en Materia de Patentes PCT., el alcance de las tales declaraciones se determinará según indiquen claramente una cesión de derechos del inventor al solicitante o su causante, de conformidad con lo dispuesto en el numeral 5.2.15 del Capítulo Quinto, Título X de la Circular Única de Superintendencia de Industria y Comercio.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No.10 de 2001.

ALIX CARMENZA GESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de
fecha 23 ENE. 2009
adpall